Food Manufacture
The Journal of the Food Industry

Vol. V. May, 1930 No. 5

Egg Preservation.

THE FACTORS influencing the keeping quality of hens' eggs are discussed by P. F. Sharp (*Ice and Refrigeration*, p. 253, March, 1930) in an article based upon the study of a number of household and commercial methods of preserving eggs in the shell. The results in all cases have been consistent in indicating that the changes in the quality during storage are dependent upon the effect of the following factors: (1) Micro-organisms; (2) quality of the fresh eggs; (3) temperature; (4) passage of undesirable odours and flavours into the eggs; (5) loss of water from the egg; and (6) the pH of the egg contents.

The possibility of the control of the pH of the egg contents as a factor in egg preservation does not appear to have been previously considered, and yet Sharp's experiments have shown that it is a matter of first importance.

By proper control of temperature, circulation, and humidity, it is possible to reduce considerably the loss of water from eggs. But other changes take place which are more detrimental than loss of water. Probably the most important of these are: (1) The increase in fluidity of the white, producing "watery whites"; (2) the passage of water from the white to the yolk; (3) the weakening of the yolk membrane, causing the yolk to flatten when the egg is broken, and, if this weakening has progressed far enough, to break.

As soon as the egg is laid the pH of the white begins to increase, due to the loss of carbon dioxide —say, from 7·6 to 9·7. The yolk of the fresh egg has a pH of about 6·0, and it also increases during storage, but more slowly than the white. These changes are brought about by loss of carbon dioxide from the yolk to the white, which in turn loses it to the air.

By the use of proper concentrations of carbon dioxide the egg can be restored to and maintained at a condition approaching that of the fresh article. Deterioration is markedly retarded. The adjustment of the pH of the egg contents by means of carbon dioxide is of great practical importance.

Storage of Fruit.

The storage of fruit in artificial atmospheres is discussed by Kidd, West, and Trout in the *Journal of Pomology* (pp. 67 and 78, 8, 1930). The commercial storage life of fruit is given as the interval between dates of storage and of the development of 10 per cent. wastage in store. Wastage of apples at 1 degree was found to be entirely due to low-temperature breakdown in green, unripe fruit, and at 5 degrees and 10 degrees to fungal rotting. The best conditions for storing Bramley's Seedling apples is 5 degrees in an atmosphere of 10 to 15 per cent. of carbon dioxide and 10 per cent. oxygen, and gave 50 per cent. greater life than storage under conditions of temperature control only.

At moderate temperatures the storage life of pears may be extended 50 per cent. by exclusion of oxygen, provided the storage atmosphere contains less than 10 per cent. of carbon dioxide. This treatment prevents the appearance of scald in susceptible varieties, and, by excluding oxygen, stops normal respiratory oxidations which produce acetaldehyde.

In his article, Trout discusses the mechanism of core breakdown.

Vitamins and Tomato Products.

An important paper on the vitamin content of tomato products was read last month at the meeting of the American Chemical Society by Kohman, Eddy, and Zall, of the Research Laboratories of the National Canners' Association.

It was stated that, although both raw and canned tomatoes have had their vitamin contents reported by several investigators, little has been done with tomato products. With one exception, canning has been reported to have no effect on vitamin C. This

exception was an experiment with the canning of tomatoes in England. As English tomatoes are grown under different conditions, the N.C.A. canned green picked tomatoes while still green as well as similar tomatoes after allowing them to ripen at room temperature. In neither case was there any noticeable destruction of vitamin C. The artificially ripened tomatoes, however, did not acquire the full vitamin C nor vitamin A content of field ripened tomatoes.

Tomato Pulp.

In the making of tomato pulp, it was found that so much air is beaten into the tomatoes by the cyclone and finisher that subsequent canning of this cyclone juice results in the destruction of practically all of the vitamin C. If this cyclone juice is evaporated in open kettles to about two-fifths of its original volume, as is the custom in making tomato pulp, it may then be canned with the retention of at least half the vitamin C, so that the finished product is richer per volume than the raw tomatoes. It was found also that if this cyclone juice is filtered to remove the pulp, the clear juice may be canned with the retention of about half the vitamin C, which indicates that the damaging oxygen is largely held as small bubbles in the pulp. This is substantiated by the fact that the pulp of cyclone juice floats when first made, but after being boiled it sinks. It has been found, further, that if cyclone juice is made by the so-called "hot break" method, in which the tomatoes are heated to boiling with live steam before passing through the cyclone, then the cyclone juice may be canned with the retention of at least 50 per cent. of the vitamin C. This indicates that the atmosphere of steam in the cyclone tends to displace the air and thus affords protection. If this effect is confirmed, the principle involved will be applicable to various industrial processes.

Whole-Fruit Preserves.

The American counterpart of jams are whole-fruit preserves. It would be interesting to know what are the possibilities of popularising this product over here, if, indeed, the matter has ever received serious consideration. There are some very attractive features which these preserves offer, particularly, to our mind, in the case of strawberries, and with a little "push" in the shape of advertising they might easily "take on"—perhaps as a very superior form of jam. For the preparation of whole-fruit preserves a certain amount of special plant is required, more especially connected with boiling operations. In order to avoid disintegration and to preserve the plump condition of the fruit, boiling has to be carried out in vacuum pans. This, of course, also helps to retain the natural fruit flavours.

Vacuum Packing for Jams.

It would appear that the use of metal closures for jams is growing, particularly in the export trade, where such a seal is invaluable for preserving the product from insects and other sources of trouble in tropical countries.

Metal seals can also be applied with an initial vacuum. This is a point of special value to the jam manufacturer, as the absence of air in the container not only helps to preserve the flavour of the contents, but also, by eliminating the mould spores which are present in the atmosphere, enables the sugar content to be reduced. This point is further strengthened by the fact that the absence of oxygen retards the growth of any such spores which may be present in the jar.

In the case of jellies or jams that are fairly liquid when filled into the jars and set hard without any air pockets, it is enough to vacuumise the filled jars when they are cold; but if the jam is very stiff and is likely to enclose small bubbles of air, it is necessary to draw a vacuum at the highest temperature obtainable without causing the jam to boil. This is round about 40° C., and at such a temperature the jam is sufficiently liquid to allow the air to be drawn out.

New Syrup Product.

"Cane cream," a new product developed by the Bureau of Chemistry from cane syrup made from low purity juices, is now being produced commercially.

Experiments made by the Bureau indicate that better grades of molasses may be produced by methods of clarification of juice without reducing the sugar yield.

Rat Control.

Continuing experiments in the Pathology Department of the Hawaiian Sugar Planters' Association, J. P. Martin reports on the relative toxicity of rat poison baits. Captive rats, it was noticed, refused to eat barium cakes unless deprived of other food. Although many rats died from strychnine poisoning, many could eat apparently unlimited amounts of wheat treated with this poison. A more attractive bait was found in the form of wheat treated with thallium sulphate, which has now been generally adopted along Hawaiian plantations as a cheap satisfactory rat bait. It has no bad taste, and its ready ingestion is favoured by the rodents. Almost complete cessation of subsequent rat damage has been determined when thallium torpedoes have been thoroughly distributed in the rat-infested areas. Such bait, however, requires to be handled with care, and skin absorption by man is avoided by the use of rubber gloves when the salt is in aqueous solution.

The 1950 Pickle.

We are indebted to Mr. Pelz, Director of the American Institute of Food Distribution, for the recipe of a most amazing pickle, thoroughly recommended for producing a violent headache and high blood pressure. It runs as follows: In order to concoct the structure of food distribution (on the American plan) for the year 1950, mix together the following ingredients, shake well, filter, boil to a syrup, and crystallise out: The influence of the Federal Farm Board; mergers by manufacturers; centralised selling organisations among canners; the growth of general food stores in the place of grocery stores; mergers between manufacturers and merchandising organisations; chain stores; voluntary chains; the anti-trust laws; the Federal Trade Commission; stock ownership by the public in manufacturing and distributing organisations; the new attitude toward large-scale business enterprises; the packers' consent decree; the development of frozen foods and household refrigeration; the increasing tendency toward packaged food products; the Louisville survey.

NOTE.—We have not yet tried this, so cannot say what result to expect. We should imagine, however, that it will blow up somewhere about the middle of the performance.

Fashions in Meat.

A revolution (in America) is brewing in the distribution and sale of meat. For years the packing industry has been in the doldrums. New fashions in dress and diet have cut down both meat consumption and packers' profits. Aroused by this situation, the brains of the packing industry have been studying the methods of successful merchandisers in other fields, and they have borrowed ideas. Thus it is that plans are being made to bring to the housewife popular cuts in packages sealed at the packing plant.

The meat shop is going to see some strange things in the next few years. The great slabs and sides of meat now constituting the principal scenery will be gone. In their place will appear frozen cuts attractively wrapped. Already an imposing list of chops, roasts, steaks, and so on, done up in various styles, is being offered by certain packers. By making these standard cuts of meat readily available to the housewife, in attractive, sanitary packages, the meat industry hopes to induce her to buy more meat, and thus to restore prosperity. Efficient cutting can be done at the factory, and there the by-products can be utilised to the best advantage. The retailer will therefore be spared these operations, and his energies can be directed to buying the cuts that his particular locality calls for, and to selling them. Consequently, his rate of turnover and profit on capital invested will increase.

Diet and Methuselah.

We diet for gout, for indigestion, for obesity, and some day we may diet to ward off that most insidious of all diseases, old age. Experiments on human beings have not yet been started, but some interesting results have been obtained by using rats. As everyone knows, the laboratory rat has already proved to be invaluable in vitamin research. It has been shown repeatedly that the normal length of life of an experimental animal can be shortened almost at will by keeping the animal short of essential food factors. The question then arose as to whether it was possible to produce a definite increase in the length of life by improving a diet which was already adequate and normal. This problem is being tackled by Dr. H. C. Sherman and Dr. H. L. Campbell in New York. The original diet (A) of the rats consisted chiefly of wheat and milk, and its adequacy was proved by the fact that families of rats continued to thrive after no less than twenty-one successive generations, all reared on this diet. One set of rats was fed on diet A, and another similar set had a diet B, which was like A except that it had a higher proportion of milk. The result was that the rats fed on diet B showed an increase of 10 per cent. in the average length of life of adults, besides a definite decrease in infant mortality.

Empire Canning Industry.

Sir Edgar Jones has extended the scope of his already fruitful activities. An influential and representative, though unofficial, body has been formed in London, called the Empire Canning Council. The object of the council is to co-ordinate the various factors that may contribute towards an expansion of canning in the Empire. A preliminary survey of the present position and the possibilities in the respective countries will be made as soon as possible. The intention is, at first, to exclude the four Dominions and Great Britain from the scheme. There is not the slightest doubt but that under the energetic and able generalship of Sir Edgar, this commendable venture will ensure a brilliant future for Empire canning.

The movement was launched on the occasion of a public gathering at the Royal Society of Arts on April 7, when, under the presidency of Sir William Furse, Director of the Imperial Institute—which is doing, and has done, important work in the development of Empire resources—Sir Edgar Jones read an inspiring paper on "The Empire Canning Industry."

Vinegar.

Vinegar is recognised as being the oldest antiseptic and disinfectant used by mankind. The value of vinegar in the treatment of disease is receiving

greater attention. The beneficial properties of the vapour in the treatment of respiratory ailments and of skin diseases have been demonstrated by the extensive researches of Dr. Kapff, of the University of Munich, Germany, and in a publication, Dr. Munchow, of Hamburg, describes the many internal and external uses he made of vinegar in German clinics. The prophylactic effects of vinegar vapour produced by simple inhalation have been carefully recorded.

There should be much material arising out of properly conducted investigations of the kind quoted above, which would be of great value in promoting vinegar sales. Who is going to be the first to put the idea into practice?

Bottled Citrus Juices.

H. Overstreet describes the Vitavac process (*Fruit Prod. J.*, p. 150, January, 1930), an "electro-vacuum" method of bottling citrus juices. It is stated that orange juice retains its colour, taste, and smell for about three days without spoilage after being opened. On account of its vitamin C content it is useful for infant feeding.

Hygroscopicity of Sugars.

Another paper presented at the A.C.S. meeting was written by Korfhage and Schuette, of the University of Wisconsin, and dealt with the hygroscopicity of sugars at various humidities.

The hygroscopic tendencies of sucrose, dextrose, levulose, maltose, commercial invert sugar and commercial syrupy glucose were studied at humidities ranging from 42 to 93 per cent. at constant temperature (25° C.). Their behaviour was observed both as mixtures of varying proportions and raw materials when boiled into hard candies.

Results obtained on pure dextrose and sucrose candies did not confirm the prediction that the latter would be relatively non-hygroscopic. A syrupy-glucose-sucrose mixture was found to be superior in this respect. Maltose candies, although inferior in quality, were found to absorb moisture at approximately the same rate as those made from a mixture of commercial glucose and sucrose.

Poultry.

As regards the grading and marking of dressed poultry, a draft scheme (Marketing Leaflet No. 17; January, 1930) has been issued by the Markets Division of the Ministry of Agriculture and Fisheries. During the last four years, the Ministry has closely examined the marketing conditions in this country (see special report on the subject, Economic Series, No. 11) and has formed the opinion that there is immediate need for a scheme of marketing reform, which, among other things, would improve the general standard of produce now placed on the market. It is a significant fact that from 20 to 25 per cent. of the supplies consumed in this country are imported, chiefly from the Continent, and secure a large part of the best trade in our markets. If present practices were completely overhauled and brought under a well organised and up-to-date system of production, conditioning, slaughtering, plucking, dressing, cooling, and packing, it is almost certain that the consumption of poultry would be increased.

Such a system involves, as a first essential, a practicable, yet scientific, scheme of grading and marking. A standardisation policy will set the trade in home-produced poultry on a sound basis, to the advantage of everyone concerned, and it will prepare the way for further rapid progress. The production of poultry for table purposes has great possibilities, but it must be tackled in a thoroughly scientific and business-like fashion. We refer the reader to Leaflet No. 17 for details of the Ministry's suggestions.

Aluminium.

An article by Dr. H. K. Schindler (*Kons.-Ind.*, p. 174, March 13, 1930) discusses the uses of aluminium vessels in the food industry. It is interesting to note the quantities of this metal which occur naturally in common foodstuffs; thus bread is stated to contain 1·48 mg. in 100 g., and cabbage 4·51 mg. Dr. Schindler quotes the results of investigations carried out by the Reichsgesundheitsamt ("Ministry of Health"), to the effect that they have never found any objection to the use of aluminium for containing and preparing foodstuffs, from the standpoint of health, and that their recent re-examination of the matter affords no reasons why they should change or in any way modify their original conclusion.

For further information on this subject, reference should be made to our notes on page 98, April, 1930.

Sausages and Ceylon.

It is stated from German sources that the demand for sausages in Ceylon is still far in excess of supplies, and that the main business in this commodity was done last year by a Dutch firm, whose products were in very brisk demand.

Norwegian Fish Propaganda.

A striking example of success attending co-operative advertising is provided by the Norwegian fish canning industry, which has £12,000 at its disposal for advertising purposes and will continue an aggressive campaign in popularising its products by means of advertisements, films, and pamphlets in the chief European countries, England included. Apparently the Government raises the funds for this purpose by a levy on all canned fish exported.

The Scientific Principles of Jam Manufacture

By T. N. MORRIS, M.A., Agric.Dip.,
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The older "hit-or-miss" methods of jam making have no place in modern large-scale production. Jam manufacture is a highly scientific process. In response to our request, the author—one of the most prominent of present-day research workers and one who has had factory experience—gives a simple, accurate account of the scientific principles underlying manufacturing operations.

SCIENCE AS applied to jam manufacture seems often to be regarded by the general public as synonymous with sophistication. It is not generally realised, however, that factory-made jam must conform to certain specifications and standards not essential to home-made jam. For instance, it must be of a consistency firm enough to meet the demands of confectioners, and to withstand the accidents of transport.

This consistency depends upon the presence of pectin; hence scientific jam manufacture is largely concerned with the correct application of knowledge concerning pectin and the laws governing the formation of the pectin-sugar-acid gel.

Pectin is derived from an insoluble substance known as pectose, which is present in many plant tissues. It belongs to the class of substances known as reversible colloids, and is soluble in water or dilute acids, forming a thick viscous liquid. It is precipitated from solution by alcohol or acetone as a gelatinous precipitate.

Pectose exists in maximum quantity in fruits at about the normal time for picking. During ripening it is changed by natural ferments or enzymes into pectin and pectinic acids and finally into pectic acid. Of these, pectin alone is capable of giving a jelly when mixed with sugar and acid; hence it is essential that fruit should be in sound condition, and not overripe, if the natural pectin present in it is to be used to the best advantage in jam-making. Pectose is converted into pectin in the factory by cooking. There is a good deal of variation, depending upon the nature and stage of ripeness of the fruit, in the ease with which this change can be brought about. In some cases it is sufficient to boil the fruit with water; in others it is necessary to cook under pressure or to boil with dilute (0·3 to 0·5 per cent.) solutions of citric or tartaric acids. Care must be taken, however, that the heating is not too prolonged or the temperature too high, otherwise the change to pectinic or pectic acids will occur.

This is important with the cooking of fruits prior to addition of sugar in jam-making and in the extraction of pectin from materials like apple-pomace. Such processes are necessary in order to liberate the pectin from the pectose, but must not be carried too far.

Fruits which contain pectose in abundance are lemons, bitter oranges, apples, quinces, gooseberries, currants, and plums. It is not so plentiful, however, in raspberries, strawberries, cherries, and blackberries; consequently, although the practice may be capable of abuse, it is quite legitimate in view of the requirements of the trade, and can in no wise be considered as an adulteration to adjust the pectin content in such fruits so that a sufficient firm jelly may be obtained.

Pectin extracts for this purpose are usually prepared in this country from apples by heating apple-pomace in an autoclave with water, or boiling it with dilute citric or tartaric acids and pressing out the liquid.

This latter may be treated with decolorising carbon and with enzymes to free it from colour and starch, clarified by filtration with Kieselguhr, and concentrated in one of the rapid vacuum concentrators.

The result is a tasteless, colourless, and entirely harmless viscous fluid containing about 3 per cent. of pectin.

Pectin can also be purchased in solid powdered form produced by precipitation from the liquid extract and subsequent drying and grinding of the precipitate. This can be conveniently brought into solution by mixing cold with a small quantity of 66 per cent. sugar syrup and then stirring in boiling water.

It has been shown that the value of a pectin solution for jam-making can be predicted to a great extent from its viscosity. The pectin content should also be determined either by precipitation with alcohol or acetone or by the more accurate method developed by Carre and Haynes. The acetone precipitation method is particularly useful for rapid tests; also the type of precipitate obtained is an excellent guide as to the nature of the pectin present. If the precipitate be hard and firm it may safely be concluded that the pectin is of good quality; if it be soft and more or less flocculent it consists largely of pectinous or pectic acids, valueless to the jam manufacturer.

The pectin-sugar-acid gel has received considerable attention in recent years. It has been suggested that it is a compound of pectin with sugar, but this is largely disproved by the fact that the sugar and acid can be washed out of it and the pectin recovered unchanged.

It was some time before the part played by the acid was realised, but it has now been shown that it is

useless to attempt to make a pectin jelly in the absence of, or with insufficient, acid.

Tarr in America, and Ogg in this country, have shown independently that the formation of this gel is not related directly to the total acidity of the mixture, but only occurs within a certain limited range of hydrogen-ion concentration.

Outside this range the mixture is a syrup; within the range the gel strength increases to a maximum and then falls again.

Tarr showed that the hydrogen-ion concentration of a pectin solution required to give maximum gel strength has a value approximating to pH 3. The hydrogen-ion concentration of a pectin jelly of maximum strength for a given pectin-sugar mixture corresponds very nearly to the value pH 2·45.

These values vary slightly according to the kind of acid present, but they should be of great practical value as a guide to the jam manufacturer.

The presence of buffering salts in the fruit also causes a slight departure from the values given; thus, the presence of sulphates has been shown to cause the point of maximum gel strength to shift slightly to the less acid end of the pH range referred to above, while tartrates and citrates shift it in the other direction and also render the jelly strength somewhat less sensitive to changes in hydrogen-ion concentration. For this and other reasons the judicious addition of salts has been found useful in preventing the condition known as "syneresis" or "weeping jelly" caused by too great acidity of the juice.

The quantity of pectin required to form a gel is surprisingly small. Ogg has made jellies containing as little as 0·125 per cent. of pectin. In practice, however, 0·5 to 1 per cent. is usually required in order to form a jelly strong enough for commercial purposes, the exact amount depending on the quality of the pectin.

The quantity of sugar necessary varies with the acidity and pectin content of the juice or fruit. When these are high, jellies can be made with less than 60 per cent. of sugar; the sugar content which gives the maximum gel strength, however, is in the neighbourhood of 67·5 per cent. Excess of sugar results in a sticky syrup.

A mixture of pectin, sugar, and acid in the correct proportions will produce a jelly in the cold. It is impossible, however, to obtain such a jelly by mixing sugar with cooked fruit pulp until a considerable quantity of water has been driven off. This is accomplished, after the addition of sugar, by boiling in steam-jacketed metal pans, and should be as rapid as possible in spite of the fact that the presence of sugar greatly slows down the destruction of pectin by heat.

The period of boiling may be shortened by adding extra pectin, if required, in concentrated form, by means of additional steam coils in the boiling pans, by adjusting the size of the boil, or even by previous concentration of the juice or pulp in vacuo. In any case, the boiling period should not exceed 8 or 10 minutes; even 5 minutes' boiling has been shown to reduce the setting power of pectin to an appreciable extent.

The instruments essential to a jam boiler are a thermometer and a shallow copper or aluminium spoon or "skimmer." As the sugar concentration increases through evaporation, the boiling-point of the mixture gradually rises. Hence the thermometer is a guide to the sugar concentration of the boil. It is only a rough guide however, even if a correction is made for barometric pressure, as the mixture, if solids are present, does not become homogeneous during the boiling period.

The "skimmer" is brought into play when the boiler sees by the thermometer that the end is near—*i.e.*, when the thermometer approaches 220° F. It is dipped into the jam and held up so that the latter falls off in drops. By this means signs of gel formation can be detected by the manner in which the jam or jelly "flakes off" the spoon, and anyone with experience is able to seize upon the point of maximum gel formation for cutting off the steam and emptying the pan. The use of the skimmer is rendered necessary by the fact that the pectin, acid, and salt content of the fruit is not strictly under control. It detects and allows for any departure from the normal.

Exact tests of the sugar content of the finished jam may be rapidly carried out by means of a refractometer. If the sugar content is too low a few pounds extra may be added to the recipe, or a little fruit or juice taken out; if the sugar content is too high, however, a little fruit, pulp, acid, or concentrated pectin according to the nature of the product may be added. In this way, after one or two trial boils the recipe for a given consignment of fruit or juice may be settled for a considerable period, or slight adjustments may be made from time to time, so as to maintain the sugar concentration between 67 and 69 per cent.

Control must also be exercised over the inversion of the sugar in the finished jam. If this has not proceeded far enough, cane sugar is likely to crystallise out in the jam after prolonged storage; if too far, dextrose may grain out and the jam become a honey-like mass.

Rapid tests must therefore be carried out on trial boils to determine the amount of cane sugar which has become inverted. Should this amount to about 30 to 50 per cent. of the original no trouble is likely to be experienced; if it is greater or less than this, adjustment may be made by cutting down the size of the boil in the former case, or adding acid or invert sugar in the latter.

It is hoped that it will be seen from the foregoing that jam manufacture is a highly scientific process. Even with an appreciation of scientific principles losses are not always easy to avoid, but it is certain that the older "hit-or-miss" methods have no place in modern large-scale production.

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Marmalade Manufacture

By J. W. BLACK, B.Sc., A.I.C.

This article is one of the very few technical descriptions that have been published on the manufacture of marmalade in this country.

EVERY COOKERY book contains directions for making at least five or six kinds of marmalade, and every housewife has her own treasured recipe or modification for the same thing.

The jam manufacturer has his own variations of method and formulæ for different types and grades, and amid all these permutations and combinations it is surprising that any similarity in the resultant products is detectable.

The fact remains, however, that marmalade is almost always recognisable as such to the palate. Some may be more pleasing, more delicate, or more distinctive than others, but the underlying quality of a citrous fruit preserve remains. The words "almost always" have been used with intention, as the writer has come across articles labelled marmalade which have greatly lacked the distinctive flavour, owing either to poverty of the preserve in the essential fruit juice, or to masking of the same with juice of non-citrous fruit.

Marmalade is essentially the preserve produced from citrous fruits, used wholly or in part, and sugar or other permitted saccharine substance. The presence of "other fruit juice" in this preserve, though not definitely forbidden, has always been regarded as foreign to its character, to an extent that does not apply to other fruit preserves. This may arise partly from the character of marmalade or may be a legacy from the provisions of the old Jam Prices Order of 1918, now lapsed, which prohibited the addition of foreign juice to marmalade.

The marmalade maker who would be successful must possess a good deal more information than would be acquired by listening to the bells of St. Clement's, which confine themselves to reiteration of the fundamentals without committing themselves to any elaboration of doctrine or practice.

Oranges and lemons are for the preserve manufacturer a trinity composed of rind, pith, and pulp, if we omit the pips, which may be regarded as original sin.

The pulp, again, known as dummy, is subdivided in manufacture into juice and tissue.

In some kinds of marmalade, only juice and rind are used to form jelly marmalade, and this leaves the problem of using up the pith and, in some cases, the partially exhausted dummy. This problem the economical producer never fails to solve.

A modern layout for the production of the various grades of marmalade provides for the handling of the whole fruit and all its various by-products from the moment the cases, packed in Seville or Malaga or Sicily, are unpacked in the factory.

Mechanical handling is used to the utmost possible extent, but owing to the variety of ways in which it is necessary to prepare the fruit for the pan a straightforward description of the process is somewhat difficult.

Grading.

In the first place, the whole fruit is passed along tables provided with travelling bands, where all undeveloped or damaged fruit is picked out and transferred to bins as waste or for special treatment.

Peeling.

The graded fruit is washed, and the pulp removed from the peel either as "dummy"—*i.e.*, whole pulp—or as disintegrated pulp. For the former process, the oranges are plunged in hot water for a short time and the peel quartered with a sharp knife and separated in four sections, the peel and pulp being transferred to separate receptacles. In the other process, the washed fruit is picked up mechanically from the bath and carried on a revolving drum automatically against stationary knives which halve the fruit, which is then carried on to pulping machines.

Pulping.

The modern pulping machine is an application of the well-known squeezer, being essentially a ribbed conoidal projection in a saucer which is kept in rapid revolution. The half of the orange is pressed against the revolving cone which scoops out the interior, leaving a clean peel. The pulp and juice may be made to flow by gravitation to any suitable receiving vessel for further treatment.

Treatment of Peel.

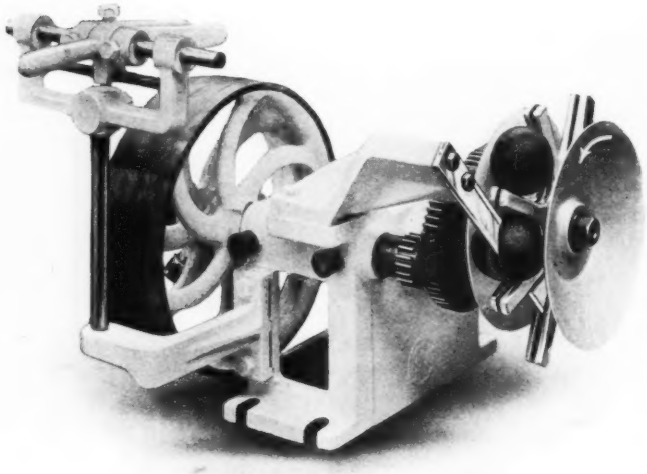
The peel, quartered, as it is obtained by the hand peeling process, or by passing through a quartering machine, is then shredded whole—that is, with rind and pith—for ordinary marmalade. For jelly marmalade, the quarters are pithed, and the thin rind, containing the oil cells, is shredded separately into the familiar form found in jelly marmalade.

Pulp and Dummy.

The dummy produced from the hand peeling process is transferred to vats and boiled with open steam with the addition of water. The dilution of orange pulp is in works practice considerably greater than with other fruit pulps. The quantity of added water plus condensed steam reduces the pulp to two-thirds or even less of its natural strength. This is determined largely by the character of the fruit itself. The steamed pulp passes from the vats to sieving machines to remove the pips, and the pulp is then ready for incorporation with the required amount of peel, which has been prepared simultaneously with the pulp.

Peel.

The shredded peel—rind and pith—is boiled in jacketed pans with water till the rind is tender and easily crushed between the fingers. The time required varies with the nature of the peel and the character of the water available and may vary from



The A.P.V. Orange and Lemon Cutting Machine.

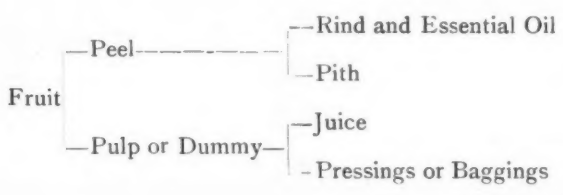
twenty minutes to one hour. When properly cooked, the peel is sieved. The rind, free of pith, is treated in the same way for jelly marmalade.

The pulp and peel prepared as described are then mixed in required proportions based on the average composition of ripe fruit and are then ready for boiling into marmalade.

Juice.

This is prepared by filtering the steamed pulp through filter presses or lambs'-wool bags filled with filter paper pulp. For extreme clarity in jelly marmalade certain absorbent or clarifying agents may be used with advantage, as otherwise a faint opalescence remains. Some successful methods for obtaining extreme clarity after boiling are kept carefully secret, but many manufacturers of jelly marmalade are content with the juice obtained by simple filtration, and could probably improve their product by simple means.

The result of all these operations is a series of products which have to be dealt with in some way or other. These may be represented by the following graphic representation:



Recipes.

In making use of these products, the jam boiler prepares various grades or types of marmalade, including jelly marmalade, which consumes only filtered juice and rind, straight marmalade, which makes use of the whole fruit practically as it stands without by-products, and other grades in which excess pith from jelly marmalade is used up along with such baggings as still contain valuable juices.

In some cases—and it seems to be an increasing practice—a few lemons are added, either chopped up with the excess pith or otherwise, to give an added flavour to the products.

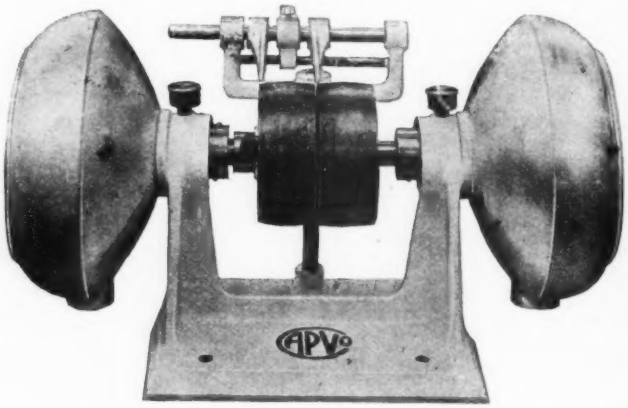
The following recipes give some guide to factory usage.

Quality.	Pulp.	Sugar.	Invert Sugar in 70% Solution.	Glucose.	Juice.	Pectin.	Weight Produced.
							cwts. qs. lbs.
Home Trade	50	58	—	10	—	—	1 0 0
Home Trade	50	70	—	—	—	—	1 0 0
Export Trade	50	54	24	—	—	—	3 18
Export Trade	48	54	24	—	—	—	3 18
Cheap Grade	50	62	—	12	—	4	1 0 10

Jelly Marmalade.	Pulp.	Sugar.	Invert Sugar.	Glucose.	Juice.	Rind.		
Home Trade ..	—	40	—	—	50	1¾	4	2 8
Export	—	40	—	—	52	1¾	4	2 6

In the above recipes it will be observed that glucose is used alternatively to sugar in some cases, but this at present is at the discretion of the manufacturer. The use of sugar in its inverted condition is made in some instances to ensure the proper relation in the finished product between sucrose (cane sugar) and invert sugar to prevent crystallisation.

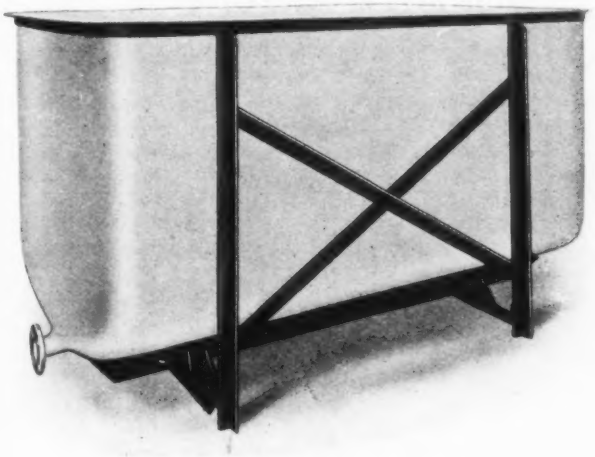
The item pectin noted in these recipes is a solution of pectinous extract added to assist jellifying. The



The A.P.V. Orange and Lemon Scooping Machine.

addition of such aids in reason is not to be objected to, but, as has been indicated earlier, marmalade should be made from citrous fruits only and any pectin used should be derived from this source. Such pectins are obtainable in powder form of various strengths—for example, 100 and 160, which means that 1 lb. of such pectin is stated to be able to set 100 lbs. of sugar in aqueous solution. Whether these

claims are fully justified or not, the strength of these pectins is undoubtedly high and the jellies they produce possess a sharp flavour in keeping with marmalade as distinct from the bland sweet flavour of apple



The A.P.V. Aluminium Juice Tank.

and other jellies. The committee at present considering jam standards will probably deal finally with this question of foreign pectinous juices in marmalades.

Boiling.

In using the foregoing recipes, the temperatures and soluble solids attained are approximately as follows:

	Temperature.	*Total Soluble Solids.*
Home Trade ...	222° F.	67-69 per cent.
Export ...	225° F.	70-72 ,, ,,
Cheap Grade ...	218° F.	64-65 ,, ,,

But as a rule the first boilings should be checked on a refractometer, reading solids percentage or water percentage direct, as the case may be. The desired result can then be expressed in terms of thermometer readings, but a continuous series of refractometer readings is not only desirable but economical.

Some modern installations are equipped or are experimenting with recording thermometers, acting either on the expansive principle or thermo-electric couple to control the jam boilings by means of carefully recorded temperatures. These in their turn are varied according to the barometric pressure in order to obtain consistent results. The actual boiling of the marmalade does not call for much comment.

In the case of jelly marmalade, the sugar may be directly dissolved in the juice by gradual, gentle warming and the whole then brought up to the required temperature. Shortly before the end of the boil the cooked shreds are added to the contents of the pan, which are then transferred to the cooler, before bottling, to prevent floating of the shreds when the preserve is at rest.

In the case of ordinary marmalade, the sugar is first dissolved either in the pan or outside, and brought up to about 220° F. The mixed pulp is then added and the whole boiled up to the required degree of concentration.

Factory and Domestic Methods Compared.

The writer has compared the recipes given in the foregoing—which are applied, of course, to the products prepared in the factory—with various formulæ expressed in other ways and of a domestic character. These formulæ usually provide for 2 lbs. of sugar to every 1 lb. of orange pulp, and lay down the amount of water to be added in breaking down and preparing the pulp for use. These recipes allow for considerably longer boiling than is feasible in the factory, and make it difficult directly to compare the proportions on a strictly comparative basis, but it would not appear that on the whole the marmalade produced from these domestic formulæ would be any richer than some of those tabulated above.

The skilled housewife or cook no doubt can make use of certain ingredients and refinements unusual in factory practice, such as the use of flavourings, or the boiling of the shreds in light syrup to enhance flavour, but the excellence of very many brands of marmalade offered to the public is their own recommendation.

The above is a photograph of two jars of marmalade sealed under vacuum with the Hazel Cap. This cap is made of a thin gauge aluminium coated with lacquer and is simply pressed on the jar by means of a vacuum sealing machine. The sealing medium is a rubber ring pressed against the outer edge of the jar.

Regarding Crustless Cheese: Wrapping and Blackening of Tinfoil

By A. E. OTTIKER, D.Sc.,
Director of Research, Aplin and Barrett and The Western Counties Creameries, Ltd.

THE FOLLOWING, in which explanations are given, may be considered as a reply to the recent criticisms on the methods of wrapping crustless cheese.

The material most used for wrapping crustless cheese portions, blocks, etc., has up to the present been pure tinfoil, which contains approximately 0·1 to 0·5 per cent. of lead and approximately 1 to 3 per cent. of antimony. Under certain circumstances it may be found that in the case of some kinds of cheese and after a certain time the tinfoil begins to blacken.

Dr. Elten, Breslau, writes in the *Chemiker Zeitung*, 1929, No. 60, that the blackish colour is caused by the adherence of some undissolved antimony to the tinfoil, and that the discoloration of the foil only takes place when the acid content in the cheese exceeds a certain limit, and that it would not occur if the acid content was low.

As regards the blackening of the tinfoil, scientists are of different opinions. Professor Dr. Bleyer thinks that the blackening is caused by the formation of sulphurous hydrogen from the sulphur-containing albuminous compounds, which are normally found in cheese. (See Circ. No. 9 of the Union of German Preserved Cheese Manufacturers, Kempten, Allgäu, March 27, 1929.)

Already, in 1923, the well-known scientist and expert, Dr. Tillmanns, Frankfurt a/M, had thoroughly examined the question of the blackening of tinfoil. Professor Tillmanns came to the conclusion that the blackening emanates from the tin and not from the antimony, and he considered the black spots to be an extremely fine layer of black tin. It is not a lead composition, because, in that case, it could only be the sulphide of lead, which is insoluble in ammonium sulphide solution, whereas the black spots on the tin are soluble.

Although acids alone blacken tinfoil due to presence of antimony, experiments with tinfoil containing only chemically pure tin in the wrapping of cheese prove that the pure tin blackens as well as the ordinary tinfoil, which contains some lead and antimony. This is further evidence that the black layer develops from tin only.

The Swiss County Laboratory, Aarau, comes to the following conclusion in its report of November 20, 1922: "Blackening, such as that of the sample, can be produced on perfect tinfoil, or on pure tin coating, by certain mediums of oxidation (such as, for example, diluted nitric acid), and is a phenomenon often found in preserves, especially asparagus. The blackening is due to the formation of stannous oxide, which is grey-black, and occasionally turns into the browny-grey of stannous sulphide. But the cause of the blackening is not to be put down to defective tinfoil, but to the cheese. The cheese must contain oxidising substances, or they must be formed during storage, and thus alter the tinfoil in the manner observed. Such oxidising materials can naturally easily be formed in cheese and are in no wise to be considered as defects, and so the blackening of the tinfoil must only be regarded as a defect in appearance, and is absolutely of no importance as regards the quality of the cheese, or from the point of view of health."

My own observations and research, carried out for many years, and covering all kinds of cheese, prove that the acid content of the cheese is not exclusively responsible for the blackening of the tinfoil; it has often been found that box-cheese with a low acid content also attacks tinfoil. When the tin is attacked, some of it goes into the cheese. The tin-content of wrapped cheese increases with the time it is stored; thus a 14-months-old box cheese was found to contain 0·13 per cent. of tin on the surface; a 2-months-old box cheese was found to contain ·045 per cent. of tin on the surface; and a 1-month-old box cheese was found to contain ·031 per cent. of tin on the surface.

Since the appearance of the blackening, and with the knowledge that after a certain time minute quantities of tin are dissolved, we have experimented for some years with a view to impregnating foils on the side which comes in contact with the cheese. In the year 1926 a tinfoil factory in Switzerland obtained a patent for improved coated tinfoils. In our own laboratories at Yeovil we found that cheese wrapped in coated foil absorbs only half the quantity of tin that would be absorbed by cheese wrapped in uncoated foil; in every case less than 1 grain of tin per pound of cheese. Since then, methods of coating tinfoil have been considerably improved, so if the proper foils are used, there should be no justification for further attacks on the method of wrapping crustless cheese in tinfoil.

It has also been suggested that waxed paper, "pergamyn," and other interleaving should be put between the cheese and the tinfoil, but these have not proved satisfactory—in time the papers get soft and mouldy. Aluminium-foil has also been tried, but after a while this metal is also affected by the cheese and disintegrates. Efforts have also been made to coat aluminium-foil and to make it more resistant by alloying it with other metals, such as silicon, and others. Up to the present, however, tinfoil still remains the best material for wrapping.

Other foodstuffs, such as condensed milk, meat, and other preserves, which are packed in tin or in tin-coated boxes, also absorb a very minute part of tin. Such small quantities of tin or its compounds are considered entirely harmless. (See Kobert,

(*Continued on page* 143.)

Chemical Control in the Jam Factory

By W. H. YATES, M.Sc.

THE MANUFACTURER may ask: "What do I require a chemist for, seeing that there are public analysts and research associations?" Well, these are useful up to a point, but if economic and efficient manufacturing is desired, chemical control on the spot is absolutely essential. By chemical control, in its broadest sense, one means general scientific control.

Having determined to adopt such control, the next step is to get a chemist. This is not quite so easy, as experienced chemists of a suitable type are not too plentiful. The jam works chemist should have a good knowledge of ordinary analytical methods, including microscopy, and ordinary bacteriological methods. He should understand the use of physical instruments, and have a knowledge of engineering. In addition, he requires unlimited patience and tact, and must have a commercial outlook.

Assuming the manufacturer has selected his chemist, he can save the latter a great deal of time by getting, if possible, advice from experienced chemists who know the practical side of jam-making, as purely academic chemists often fail to see the manufacturer's point of view.

If the works is very small, it is quite a good practice to get a youth or girl trained to do the chief routine tests, and the manager can then make use of the results.

The chemist having been installed, he will find it advisable to get a thorough working knowledge of the methods used in the works, and to do this he should make a point of gaining the confidence of the works manager and foremen. It must be remembered that these men have often long practical experience, and a scientific explanation of many points will make them keen on the chemical control, as it will relieve them of considerable worry and anxiety. The chemist who can put a complex chemical reaction into simple language is the man most likely to succeed. It is no use talking in the clouds.

As the chemist's work is to see that good jams, etc., are made as economically as possible, it is advisable before taking up his post to look up all the literature he can find on the subject. He must, of course, bear in mind that literature on the subject requires very careful sifting, as statements are not always borne out in practice on a large scale, the literature often only dealing with small laboratory tests.

Now, in order to produce good jams, etc., it is absolutely essential to get quick results in the laboratory, as it is necessary to know that the jam, etc., will be right in every way before it is made in any quantity. It is no use knowing to-morrow that to-day's work is all wrong.

Experience will soon enable the chemist to determine beforehand what results he will get in the works, and in order that he may watch the various processes the laboratory should be as near as possible to the manufacturing.

Good jam must have the right colour, flavour, consistency, and keeping qualities.

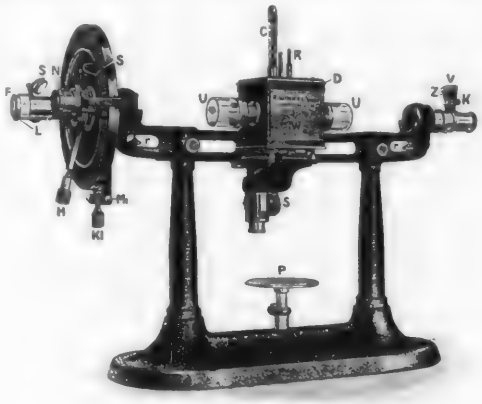
These depend on raw materials and method of manufacture. The skill of the chemist in dealing with fruits in the various stages of ripeness with which he will meet, in order to get the best results, will be taxed to the utmost extent, and he will find that it is not by any means a very easy problem. Nothing must be left to chance. Colour and flavour depend largely on the raw materials and method of manufacture, as stated above. Consistency and keeping qualities are dominated further by the relationship, sugar, acid, pectin. The determination of these as quickly as possible is necessary, and methods must be adopted which will give figures to enable the works to get on with the day's programme.

Sugar.—As glucose is not extensively used in jam-making, the chemist will find that he has generally only to deal with refined beet or cane sugar.

He requires to see that the sugar is up to standard, and then he must know the amount of inversion which takes place, not only in the actual boiling process, but in the finished product, during the process of cooling in the various containers into which it is placed for sale. Further, he must know the total sugar, or the total soluble solids. A polarimeter such as supplied by Zeiss may be used for these determinations, but as it is rather a slow process it is not generally used.

The usual practice is to determine the amount of inversion, by the well-known standard volumetric method, using Fehling's solution and methylene blue as indicator. This method will give the inversion, which has taken place in the boiling process, easily in fifteen minutes. So by making a trial boil one can soon fix the proportions to enable the works to get going; allowance can be made for any subsequent rise in the amount of inversion, as this will soon be a known quantity.

The total sugar can be determined by total inversion



The Landolt Polarimeter.

(By courtesy of Carl Zeiss [London], Ltd.)

of the sample, and estimation as for invert as above. From this figure the amount of cane sugar can be calculated, and this plus the invert gives the total sugar. This operation has to a large extent been dispensed with, and the total soluble solids is determined on a refractometer of special design. The best instrument for the purpose is one supplied by Zeiss, and is graduated in refractive indices, and also in sugar percentages. The latter readings, in the case of jams, are generally taken as total soluble solids. This instrument is useful for many purposes, and in many cases it can be applied to advantage actually in the works, as well as in the laboratory. The soluble solids are given direct by this instrument in a few seconds, and only a minute quantity of the product is required. Special types of this instrument can be applied even in the boiling process in some methods of manufacture.

Sugar Refractometer.

(By courtesy of Carl Zeiss [London], Ltd.)

The two determinations—invert sugar and soluble solids—decide the question as to whether the jam, etc., will keep as regards crystallisation, fermentation, and moulds. Jams or jellies, which are to be sealed hermetically in jars or tins, and subsequently sterilised, will also require the chemist's supervision.

Pectin.—The next item is pectin. This colloid body, about which in recent years so much has been written, is one which will give the chemist trouble owing to its variable and erratic nature under the conditions of manufacture. The consistency of the jam or jelly depends on the quantity, and quality, and the treatment it receives in the various processes.

Many methods of estimation have been suggested. It is, however, essential that the one adopted must be rapid and reliable. The calcium pectate method is slow and unreliable as to quality. Viscosity and specific gravity tests are also of little practical value. Long experience has proved that up to the present, precipitation with acetone, drying, and weighing, gives the experienced chemist the best indication as to quality and quantity, and assuming that he knows the factors for the various fruits, he will find that he is able to give the proportions required to ensure good results. This test can be carried out in fifteen minutes in any juice, and it can easily be applied to determining the value of fruits as regards pectin contents.

Acidity, or, more correctly, hydrogen-ion concentration, is the next thing to take into consideration, as it plays a very important part in the inversion which takes place, and, further, in conjunction with the pectin and sugar determines the consistency. Its action as regards pectin is so pronounced that its control is of great importance. If the acid factor of the jam or jelly is too high—*i.e.*, too low a hydrogen-ion value—the results will not be satisfactory. On this account the chemist should pay attention to buffering actions and methods. These have been practised with success for very many years secretly. The acidity as determined by neutralisation with alkali will generally give a good idea as to what to expect. A comparator or hydrogen-ion apparatus is a very useful addition to the laboratory equipment. One of the latter is now available which gives very quick results, as it is only necessary to set the dial to seven—*i.e.*, neutral point—and titrate back to zero. With this apparatus solids or colour do not interfere.

Having given briefly the most important routine tests, it may interest the chemist to know some of the other directions in which he is likely to find his energies directed, owing to troubles which may arise.

Other Considerations.—To begin with, a knowledge of the water supply will be very useful, as this is often a source of considerable trouble, not only in the boilers, but it may play an important part in the actual jam boiling, and, further, it may influence the quality of the finished product.

The examination of raw materials for adulteration, preservatives, and metallic contamination will also require to be done. Further, metallic contamination during manufacture is one that often gives trouble and requires great care, as sometimes it is difficult to trace.

Testing of coal, oils, colours, etc., also will require to be taken into account.

He will find many other matters to consider, such as testing thermometers, examining the flue gases, etc., the testing of the clarity of juices, jellies, and syrups, and the determination of the consistency of jellies.

He will find on the market apparatus which is very useful, also some of little value, and he will have to adapt the same to suit his requirements. For comparing clarities, also colours, he will find a Stupho photometer very useful. As regards jelly consistency, there is not to the writer's knowledge any really good and reliable instrument, although many attempts have been made to devise one. Unfortunately, such ones as have been put on the market leave a great deal to be desired, especially with fruit jellies.

The Pulfrich Photometer.

(By courtesy of Carl Zeiss [London], Ltd.)

Centrifugal Separators

By R. H. DOLTON, B.Sc., A.I.C.

PART I

THE SEPARATION of a mixture of two immiscible liquids, or the removal of a solid from a liquid, is a problem of ever-increasing importance to modern industry. The older methods of gravity settlement, filter-pressing, etc., are still very extensively used; but with the demand for rapid handling of materials and the attainment of a higher standard of purity the more recent process of centrifugal separation is rapidly gaining ground in many directions.

Everyone is familiar with the fact that if a mixture of two immiscible liquids, or a mixture of a solid and a liquid of different specific gravity, is allowed to stand, separation between the two components will take place. This separation is due to the difference in the force of gravity acting on the materials separated. In gravity settlement the force acting on the particles which have to be separated is very small, and the distance through which the particles have to travel is often comparatively large, and, therefore, separation is slow and often incomplete.

Centrifugal separators are in effect high-speed settling tanks; they are machines in which a separating force thousands of times greater than gravity is produced and in which the distance through which the particles have to move is very considerably less than in a settling tank. Hence the time for separation is greatly reduced and, whereas liquids have often to be left in settling tanks for many weeks or even months, a centrifugal purifier will effect separation almost instantaneously, thus enabling continuous operation to be obtained.

This fact is well illustrated in Fig. 1, which shows two test tubes, each of which contains the same quantity of oil, suspended impurities, and water. The left-hand tube stood undisturbed for a period of twenty-four hours, and separation was produced by gravity settling, whilst the right-hand tube was subjected to centrifugal action for a few seconds. The results obtained show in a convincing way the superiority of centrifugal action over gravity settling.

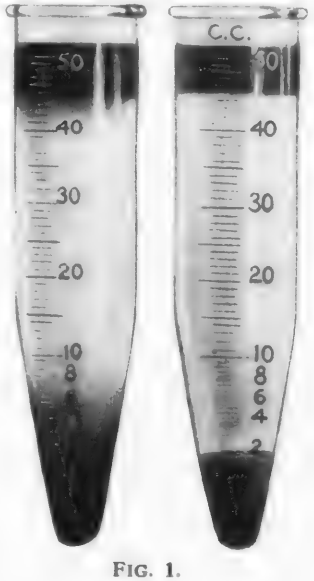


FIG. 1.

The problem therefore becomes one of how to apply centrifugal force in the most efficient manner possible, and this is best illustrated by considering the action of a typical separator.

How the Centrifuge Works.

Fig. 2 shows the bowl of the centrifuge, and it is in this part of the machine that centrifugal separation takes place. To understand the action of the separator it is best to consider what happens to a sample under treatment, as, for instance, a mixture of water and oil contaminated with a small amount of solid sludge. This mixture is fed into the top of the bowl and, passing down the central channel, it acquires the same speed of rotation as the bowl itself. The liquid then rises between holes punched in the clarifying cones, by which it is divided into a large number of very thin films. These cones are made from thin metal sheets, and are provided with metal spacing pieces to keep them apart. The cone construction serves two important purposes:

(*a*) It greatly increases the surface area in which separation occurs.

(*b*) It prevents turbulence and consequent re-mixing of the liquids after separation has taken place.

The mixture during its passage between these discs is acted upon by centrifugal force. Water, being the heavier liquid, travels outwards at right angles to the axis of rotation whilst the oil moves inwards. The water has only to travel less than 1/32 of an inch before it strikes the under side of one of the cones and then travels downwards and outwards to the

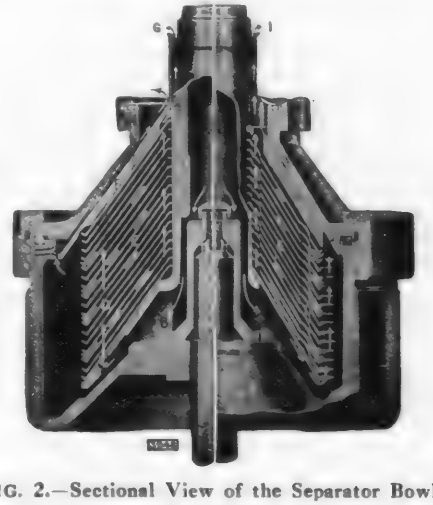


FIG. 2.—Sectional View of the Separator Bowl
(By courtesy of Alfa-Laval Co., Ltd.)

base of the cones. Similarly, the oil travels inwards and upwards towards the centre of the bowl, and thus the mixture is separated into its components in such a manner that remixing of the two is impossible. Any heavier solid particles are forced with the water to the base of the cones and are then thrown off into the sediment space. The water and oil are discharged from the bowl of the separator into collecting trays, and it is possible, working under correct conditions, to get a continuous discharge of clean oil and water from separate spouts of the centrifuge.

When the machine is required for the removal of a solid from a liquid, or of a small quantity of one liquid from another liquid—for example, a small amount of water from oil—the bowl is assembled as a "clarifier." The right-hand section of Fig. 2 illustrates this method of working, and in this case the heavier liquid—*i.e.*, the water—is retained in the sediment space of the bowl, together with any solid dirt. It is obvious that the machine would only be run as a "clarifier" when the liquid to be purified contains only relatively small amounts of impurities, whether solid or liquid.

Fig. 3 is a sectional view of a centrifugal separator. The bowl can be seen in position in the frame of the machine, whilst the vertical spindle and worm and wheel drive are clearly shown. The collecting trays for the separated liquids are seen in position with spouts for delivering the liquids to suitable tanks, etc.

Materials of Construction.

The next important point to be considered is the material of which the bowl and collecting trays are constructed. For the treatment of mineral oils and all standard non-corrosive liquids tinned steel is usually employed on account of cheapness and general utility. When, however, food products have to be dealt with, tinned iron and steel are sometimes unsuitable, and in such cases the material used may be copper, phosphor bronze, stainless steel, or monel metal. These metals are, of course, more expensive, but they offer more resistance to the corrosive action of fruit juices and other substances of an acid nature than does tinned steel.

Sizes and Capacities.

Just as the amounts of materials to be handled vary very considerably in practice, so do the sizes and capacities of the separators. The manufacturer requiring to treat only two or three gallons per hour of an expensive material finds his needs catered for by a small machine, whereas the larger separators, capable of dealing with several tons per hour, serve the requirements of the large-scale manufacturer.

The capacity of an industrial separator depends upon the viscosity of the liquid under treatment, the nature, condition, and quantity of impurities to be extracted, and the degree of purification required, and hence any figures for capacity are of little value unless coupled with some definite conditions. It is therefore a common practice to determine the capacity of a separator from the quantity of mineral lubricating oil which can be purified, assuming that the oil at the time it is passed through the machine has a viscosity of approximately 100 seconds R.1, that the oil is not badly contaminated with impurities, and that a degree of purification which will meet average industrial requirements is necessary.

Working upon this basis the capacity of the smallest separators would be 10 to 14 gallons per hour and the capacity of the largest would be up to a maximum of 1,400 gallons per hour.

Any liquid having a lower viscosity than that stated could be purified at a higher capacity, and the reverse for a more viscous liquid.

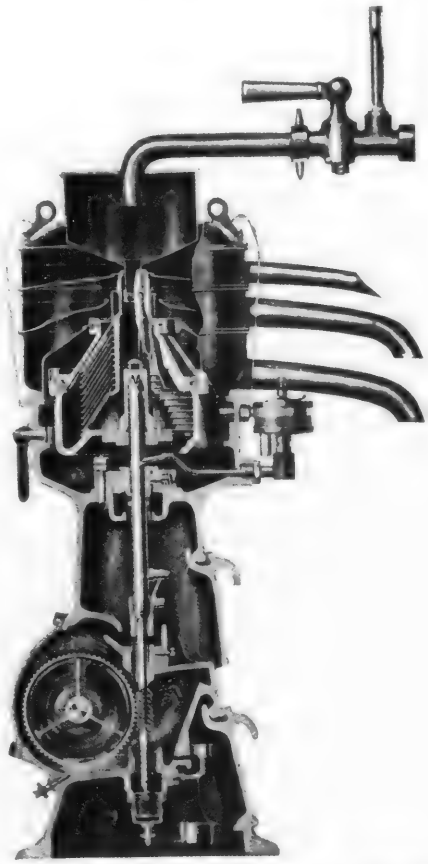


FIG. 3—Sectional View of De Laval Separator.

(To be continued in next issue.)

The next issue of FOOD MANUFACTURE *will contain valuable articles of special interest to Jam and Jelly Manufacturers (see page 143).*

It will also give some extremely important recent developments in machinery and processes for the manufacture of Crustless Cheese.

The Manufacture of Jam, Marmalade, Jellies, and Candied Peel

The following particulars, which apply to modern factory processes and equipment, will be found to include a great deal of useful information of a practical nature. We are indebted to William Brierley, Collier and Hartley (Rochdale), Ltd., for these particulars and to Messrs. St. Martin Preserving Co., Ltd., Slough, for the factory views.

PARTS I and II

Part I.—Manufacture of Jam

THE FIRST requisite is a boiling apparatus such as the *jam pan* (see Fig. 1). Originally these used to be made with copper inside cases and cast-iron outside cases for a daily working steam pressure of 70 lbs. to the square inch. Nowadays, most firms have them constructed for a daily working steam pressure of 100 lbs. to the square inch, as the higher pressure gives a quicker boil and a better colour.

At the same time, however, it should be noted that too high a pressure, with its consequent higher temperature, destroys the form of certain types of fruit, such as strawberries. This applies especially to firms putting up fruit in glass jars.

A point to be noted when purchasing these pans is to ask the manufacturer to state the thickness of the metals used, as this carries great weight with the insurance companies, and also the depth of the steam space in the pan, as the bigger the steam space the quicker the boil.

These pans are now supplied fitted with inside cases plated with tin or silver, or made entirely of nickel, aluminium, stainless steel, or monel metal. They can also be chromium plated if desired. They are, therefore, largely used in the manufacture of pickles and sauces or other batches containing acids.

Fruit Pulping.

The next essential machine which every jam manufacturer must use is a *fruit pulping machine* (see Fig. 2). This consists of brushes revolving in a circular sieve, the latter being built in the machine on an incline. The fruit is poured into a hopper, and the brushes revolve at 600 r.p.m., brushing the pulp from the fruit and delivering the refuse at one end of the machine and clear pulp at the other.

As now constructed, however, the finished pulp can be delivered either in the centre and below the machine, or on either side, as desired, but, of course, this must be specified when ordering the machine. Sieves of all meshes down to 1/64 inch can be supplied to fit the same machine.

The trouble in the past has been that these machines were very noisy, but in the type illustrated the makers have now incorporated several patents. Amongst others we may mention spiral gears running in an oil bath with ball bearings and thrust races, allowing the machine to be run at double the speed of the old type. In previous models there was considerable trouble with the oil running down the shaft into the pulp and the acid running up from the fruit and attacking the gears. With the present machine this has now been eliminated.

The bottom end of the brush shaft is carried in a hammock bearing, so that there is no trouble due to the shaft running out of truth, as it finds its own centre.

FIG. 1.—Single Battery of 30 Jam Boiling Pans.

(By courtesy of Messrs. St. Martin Preserving Co., Ltd., Slough, and Messrs. Brierley, Collier and Hartley, Ltd.)

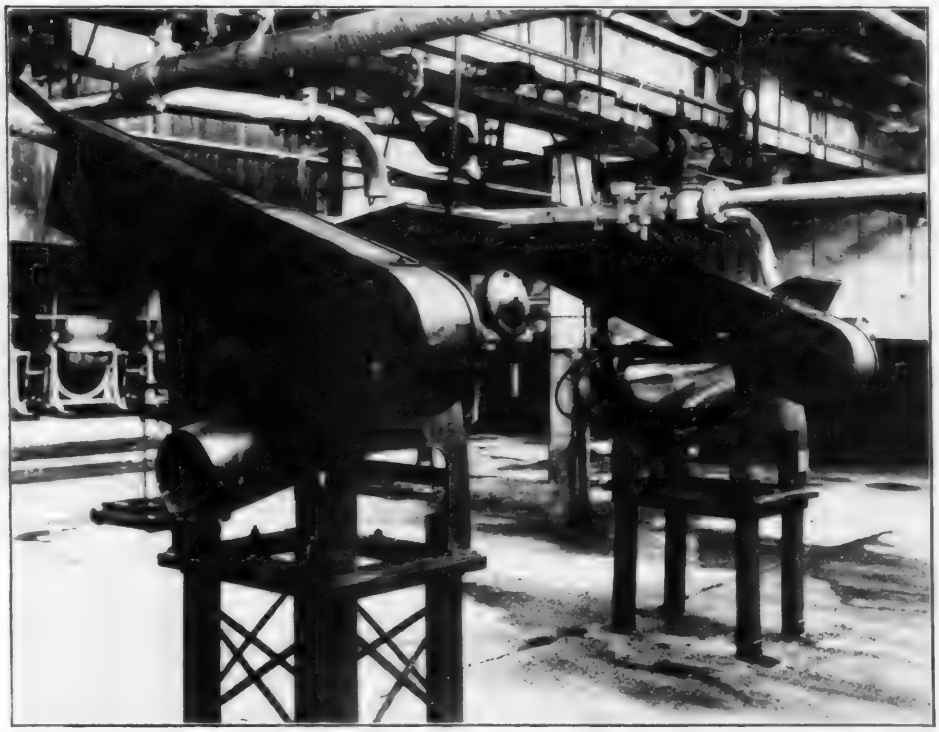


FIG. 2.—Two 15-in. Pulping Machines in Stainless Steel, showing Pulp Outlet at side.

(By courtesy of Messrs. St. Martin Preserving Co., Ltd., Slough, and Messrs. Brierley, Collier and Hartley, Ltd.)

Within the last few months a new idea has been incorporated into the machine which makes the removal of the brushes and their holders a matter of moments, so that they can be reversed for wear. With the older models it was necessary to remove the brush shaft completely, thus disturbing the packing gland. The sieves, of course, can be changed in a couple of minutes.

Picking.

When dealing with black or red currants, a *picking machine* is required, as otherwise the stalks must be removed by hand. This machine is universally used in this country and on the Continent, especially so in Holland, which supplies vast quantities of fruit to Great Britain.

The machine consists of an inclined reciprocating screen, through the interstices of which mechanical fingers rotate at the rate of 200,000 per minute. This machine will not only deal with black currants, but also with red currants when the latter are in a hard condition and a few days old.

As regards output of this machine, on a test made, two machines running 296 hours picked over 150 tons of currants, or an output of a quarter of a ton per machine per hour over an entire season. It is not claimed that every machine will do this, owing to interior organisation, but it has been attained. Some firms have as many as sixteen of these machines at work.

Snibbing.

When dealing with gooseberries, a *gooseberry snibbing machine* is required, and is made for hand power and in larger sizes for power. This consists of a cylindrical-shaped vessel lined with carborundum, and at the bottom of the cylinder is a revolving plate, also covered with carborundum. The gooseberries are put in through the hopper and water injected, and the tops and tails are removed from the gooseberries, together with the hair. The large machine is capable of an output of one ton per hour.

Steaming Barrels.

A number of firms use *steaming barrels* for a variety of purposes (see Fig. 3). The machine consists of a large, heavy barrel made from well-seasoned yellow pine, 1¼ inches thick, and it is guaranteed to last longer than oak and without having a tendency to shrink. A perforated copper coil is fitted into this barrel, and it is made to tip. In the old type of barrel the coil ran down the centre from above, and when it was desired to tip, the steam had to be turned off and a union undone. In time the valve leaked and scalded fingers were not unknown.

In the latest type the steam is introduced at the side in an exactly similar way to the jam pan. A new method of holding the barrel in position has been incorporated, and when it is desired to tip the barrel the catch is operated by a foot pedal, leaving the hands free.

In addition, the weight of the barrel is carried by thick clips running its full length and not by bolts running through the wood, giving a much longer life to the barrel.

Cooling, Transport, and Filling.

For the cooling of jam there are many types of apparatus on the market, but of the more inexpensive, *water-cooled pans* or *troughs*, can be supplied. Again, *wooden tanks*, fitted with a copper-lined bottom through which water is continually passing, can be supplied.

For carrying the jam, *bogies* are supplied fitted with rubber tyred wheels and of varying capacities. These are made from either aluminium or copper.

The most efficient of the inexpensive methods of

jam filling is an *adjustable table*. This is circular, and the jars are placed on the outer edge. As each jar is filled, so the operator revolves the table, whilst another operator removes the filled jars and replaces them with empty ones. For ease of working the B.C.H. filling table is fitted on ball bearings, which is a great advantage over the original pattern.

With regard to *fruit bottling* a very simple apparatus is used which consists of a large galvanised iron tank through which a steam coil runs. The filled bottles are placed on a perforated tray and the temperature of the water raised by means of a steam coil. The same apparatus can also be used for canning meat, but in this case the water is replaced by brine.

It is is desired to deal with pineapples, special machines are used for peeling, coring, sizing, and slicing. Other machines which are employed are, for example, apricot halving machines, quartering machines, and apple peeling and coring machines.

There are, naturally, certain small utensils which are required, but these are very few, consisting of filling buckets, skimmers, ladles, and pourers, all of which can be made in any of the metals mentioned above.

Part II.—Manufacture of Marmalade

Turning to the manufacture of marmalade, there has been an astonishing invention within the last three years that has completely revolutionised the manufacture of this article. We will, however, mention this later.

To commence with, the first necessity is the boiling pan, as mentioned above. The next necessity is a pulping machine, previously dealt with.

Steaming barrels are also used and for two or three purposes. It is a matter of opinion whether the peel of the orange should be cooked before or after cutting, some manufacturers preferring one method and some another. A number of manufacturers use their steaming barrels to cook the peel before cutting and then boil the centre, or "dummy," of the orange in the steaming barrels before putting through the pulping machine.

This latter machine, of the large size, we have seen give an output of seven tons per hour on raspberries, and over five tons per hour on orange "dummies," the hopper being fed with a 3-inch pipe.

After the removal of the skins, as mentioned before, the "dummy" is cooked and put through the pulping machine, which removes all the pips and skin holding the fibres and juice together. If it is desired to cut up the "dummy" and put it through the pulping machine before cooking, a machine on the principle of a mincemeat chopper is used.

The next process is for the peel to be cooked and passed through the cutting machines, or left uncooked according to the method of manufacture.

Manufacturers supply three distinct kinds of marmalade: (1) With the peel cut in thick pieces and having the white inside still adhering; (2) the peel cut into thin shreds, still with the white adhering; or (3) with the white removed and the peel cut into thin strips, as used in jelly marmalade. The second method is the more common.

A machine is used for cutting the oranges in half, and this consists of a number of cups revolving against a large circular revolving blade, the oranges dropping out automatically after they have been cut (see Fig. 4). The two halves of the orange are then taken to a *gouging machine* which consists of a horizontal shaft fitted with a cast aluminium rose at each end in a suitable receptacle (see Fig. 5).

The half of the orange is then pressed against this rose and the "dummy" removed. If it is desired to have the peel in quarters, as it is by most manufacturers, the half cap of peel can then be placed in the halving machine and cut into quarters. The method

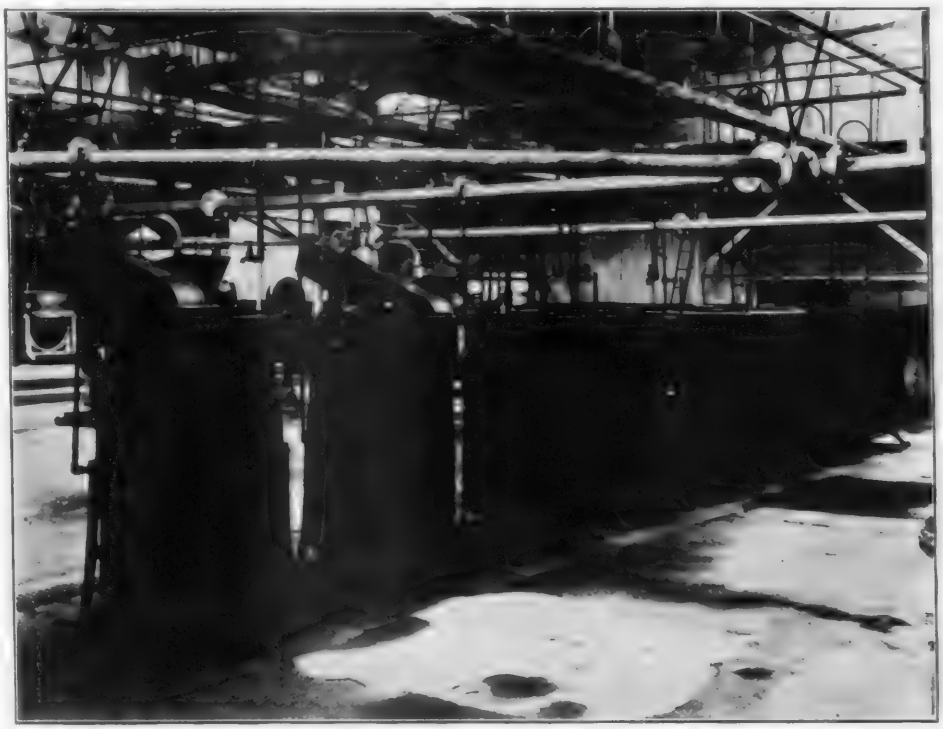


FIG. 3.—Battery of Steaming Barrels.

(By courtesy of Messrs. St. Martin Preserving Co., Ltd., Slough, and Messrs. Brierley, Collier and Hartley, Ltd.)

FIG. 4.—Orange and Lemon Halving and Peel Quartering Machine.

(By courtesy of Messrs. Brierley, Collier and Hartley, Ltd.)

generally employed, however, is for girls to strip peel from the oranges in quarters with small hand knives.

The next process is cutting up the peel, and it is at this point where we come to the two machines which have revolutionised the cutting of orange peel.

About three years ago a machine was placed on the market entirely different in design and having a much greater output than any that had so far been produced. Not only would this machine cut peel of varying thicknesses and leave the white adherent, but by the adjustment of four screws, taking a couple of minutes, it would also remove the white, cut the red portion of the peel into shreds and also the white portion, thus immediately taking the place of two of the old type machines.

This machine was so valuable that it was suggested to the manufacturers that it was impossible to instal these machines for a double purpose, as they could not be spared during the season to be on two classes of work, and that it would be better if two machines were constructed, each embodying its own idea. It was, of course, admirably adapted for the manufacturer who only required a small output of one type of peel.

This suggestion was carried out, so that manufacturers have now a choice of the three machines—that is, the double purpose machine, the chipper, and the shredder. These machines are now made, if desired, in monel metal and stainless steel, and, in fact, some manufacturers clean them by keeping them running and letting a flow of hot water run all over them.

The chipping machine has the amazing speed of 32,000 cuts per minute. It was originally fed by hand, but is now fitted with an automatic feed belt, on to which the peel is thrown by hand. This machine will not only take raw peel, but will take either quarter or half caps, cooked peel, lemon peel, grape fruit peel, and peel from the brine. It is practically impossible for a piece of peel to get through the blades without being properly cut, and the result is a vast improvement on the old type machine.

The thickness of cut is determined by a number of change wheels, and this can be adjusted in a couple of minutes. In principle, the machine is similar to that of a lawn mower, a number of blades being set spirally across a roller and revolving at high speed against a stationary blade. In one factory alone this machine is doing the work of six of the old type machines and does away with eleven women, and yet the cost of one machine is only 25 per cent. more than the old type.

This machine has actually been known to chip perfectly 14 lbs. of cooked peel in ten seconds, although this was an extremely severe test and is not recommended for daily working. Actual users, however, have obtained an output in peel from the brine of 9 cwts. per hour, and in raw peel 4½ cwts. per hour.

The shredding machine (see Fig. 6) is used in the manufacture of jelly marmalade. The peel is fed into

FIG. 5.—Orange and Lemon Gouging Machine.

(By courtesy of Messrs. Brierley, Collier and Hartley, Ltd.)

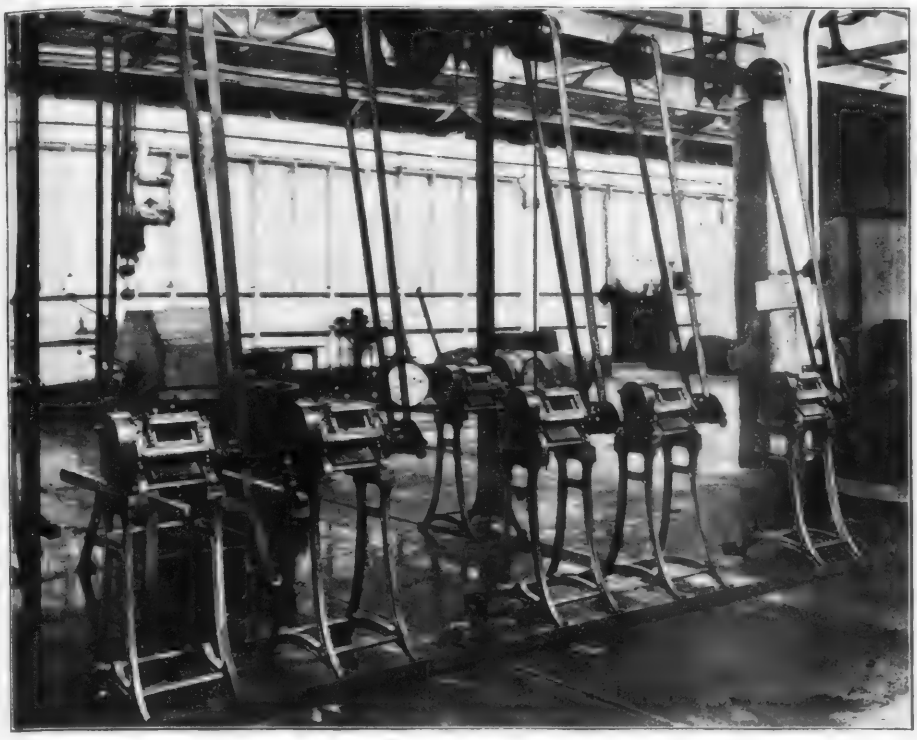


FIG. 6.—Battery of Peel Shredding Machines.

(By courtesy of Messrs. St. Martin Preserving Co., Ltd., Slough, and Messrs. Brierley, Collier and Hartley, Ltd.)

it in quarter caps and it removes the white, at the same time cutting the red into shreds. The length of the shred has to be stated when ordering the machine, but the width can be varied at will, as also the amount of white removed. The red portion of the peel also contains the very valuable essential oil of orange, and by an ingenious device on the machine quite a proportion of this oil is extracted as the peel passes through the feed rollers.

One firm reported that they had obtained 36 ozs. of fluid from 112 lbs. peel in 64 minutes. This fluid, however, has to go through a certain process in the laboratory to extract the essential oil, but the fluid yields approximately one-third essential oil. The value of the machine, apart from its cutting, will be realised when you can pay anything from 8s. to 14s. a pound for this essence and only about a teaspoonful is used to a 40-lb. batch of marmalade. The machine will give an average output of 1 cwt. of chipped peel per hour.

(To be continued in next issue.)

(Continued from page 134.)

Lehrbuch der Intoxication, Vol. XI., p. 388.) A daily absorption of 30-40 mg. is not considered detrimental to health.

See also G. S. Buchanan and S. B. Schryver ("Reports of the Inspector of Foods," No. 7, 1908, 1-30). Dr. Schryver himself for three weeks took quantities of a tin salt equivalent during the first week to 1 grain (65 mg.) of tin per day, in the second week increased to 2 grains (130 mg.) per day, and in the third week increased to 3 grains (195 mg.) of tin per day, and felt no ill effect.

Dr. Elten also says that crustless cheese is generally made from naturally produced cheese which is often of inferior quality. This remark cannot be generalised, and it is a well-known fact that the important English cheese factories are using only first-grade cheese for this purpose. It is also to be said that English-made fancy Cheddar cheese contains more fat and less moisture than most of the imported Continental cheese.

Important Articles for Next Issue

The above article will be continued in the June issue. Part III. will deal with the manufacture of Candied Peel and Part IV. with the manufacture of Table Jellies.

There will also be an important article on Table Jelly Manufacture, by H. G. Watts, B.Sc., A.R.C.S., A.I.C., and it is safe to say that never before has so valuable an article on this subject been published.

In addition there will be a special article on Jelly Testing, and some useful Recipes on the preparation of Calves' Foot Jelly, Jelly Crystals, and Lemonade Crystals.

Finally, included amongst other articles, will be one of very great interest to manufacturers in this country. This will give an account of the latest methods and appliances used in the manufacture of Crustless Cheese, and has been specially contributed by the leading authority on the subject.

Trade News

A New Parching and Finishing Conveyor.

We illustrate above a view (taken from one end) of the Kellie Conveyor for packing jams. Essentially, this machine consists of double conveyors, one the parching and drying conveyor, which is a wide, slow-running type, and the other the labelling and finishing conveyor, which is of the narrow, fast-running type. It is generally the practice of the parching conveyors to operate in conjunction with the labelling machines.

At the feed end the jars are washed clean of any surplus jam which may have spilled over when filling, topped, parched and tied, thereafter passing through the tunnel where they are dried by a current of hot air. On issuing from the delivery end of the tunnel the body labels are affixed to the jars by the first labelling machine, thence passing along the conveyor into the wrapping section, after which top wrapper labelling and body wrapper labelling is effected, the finished pack ultimately being conveyed on trucks to the despatch department or stock room, as the case may be.

The output of the complete plant represented by the above photograph is essentially dependent upon the ability of the girls operating the labelling machine, but a normal output under ordinary circumstances is about 36 2lb. jars per minute—*i.e.*, 36 jars can be washed, topped, parched, tied, dried, labelled, wrapped and delivered per minute. To handle this output fourteen girls are usually deemed necessary—*i.e.*, three girls washing off surplus spilled jam; four girls topping, parching and tying; one girl body labelling on machine; three girls wrapping; one girl top labelling on machine; one girl body wrapper labelling on machine; one girl delivering and packing in trucks, or on auxiliary conveyor to the despatch department.

When a system of machine filling is used, however, it may be possible to dispense with the services of one girl washing.

Jar labelling machines, it should be noted, do not form an essential part of the Kellie Parching and Finishing Conveyors, although it is desirable that these units, wherever possible, should function together as one complete system. If hand labelling is required it is the usual practice to perform this operation at the feed end of the conveyor, that is, prior to entering the tunnel, so that the parchment and body labels can be dried in one passage through the machine. When labelling by mechanical means, however, the labelling machines are placed preferably at the delivery end, the reason being that a quick drying adhesive is used which dries instantaneously, or at least fast enough to permit of the wrappers being immediately applied. There is, therefore, no point in locating labelling machines at the entering end of the tunnel, but there is a virtue in their position at the delivering end as it distributes the girls to better advantage around the working area of the conveyor tables.

The whole equipment would be operated by two electric motors arranged to suit the electricity supply. In addition, there is an electrically driven fan. This permits of the complete system being at the most convenient spot in the factory. The Kellie system introduces into the finishing department a one-way routing system and a methodical way of performing a specialised duty which does not usually receive the consideration it deserves.

New Containers.

The subject of containers for all kinds of goods is of perpetual interest, perhaps more so to-day than ever, as the public demand is growing increasingly critical. The primary considerations of a container are its hygienic properties, its attractiveness and its cost.

The Universal Seamless Containers, made from wood pulp, are an extremely interesting innovation. These seamless containers are moulded from wood pulp to any shape that may be required. The raw material in liquid form is driven under pressure into patent moulds; all moisture is squeezed out of the material, and the process is completed by super-heated steam drying. The heat application at a temperature between 650 and 700° F., together with the introduction of a waterproofing material into the stock, makes the container hygienic and waterproof. By admixing into the wood pulp solution various chemicals, containers may be made greaseproof, fireproof, acid-proof, non-hygroscopic and non-electricity conducting.

The plant which is being installed will be capable of a large output. Meanwhile the experimental plant can produce all samples which are necessary for the guidance of the buyer. The articles already produced are extremely varied, including lidded boxes and canisters for coffee, tea, salt, cleaning powders, etc., bottles for milk, etc., (which can be machine filled and capped on existing machinery), berry baskets, fertilising and unbreakable flower pots, cream and honey containers and novelty shaped sweet containers of considerable attractiveness.

Visible Outlet Filter Press.

This filter press has been designed and patented, British Application No. 18172/29, for use where a common closed outlet is desired. It

is illustrated below, and is made by Kellie of Dundee. Such a press can be used for many purposes, for example, where a volatile solvent is present, or where it is advisable to prevent the filtrate coming in contact with air, or where the filtrate requires to be delivered to some distant point.

In considering what a good filter press should do, it is necessary, very carefully, to consider each case independently on its own merits.

Take the brewing trades; in these it is essential to prevent loss of material and often to ensure that as far as possible all yeast cells and bacteria, etc., are removed.

Further the materials from which the filter press is made must be such that any corrosion or erosion of same will not destroy the efficiency of the press. This is a most important point, as no material is known which is free from these defects. In spite of all attempts to dispense with pulps, cloths, etc., and further to attempt to clean by back-washing, it is highly probable that a filter press using a cloth of suitable material with a good Kieselguhr, properly controlled, will produce more efficient and more economical filtration than any other type of filter. Of course, sand and porous earthenware filters come under a different category, as they have their special uses.

In some cases the use of Kieselguhr is not possible, as it is the solid that is required, for example, in a yeast press, or for dyes, etc.

Where a common closed outlet is necessary or advisable, as in the case of beers, wines, vinegar, gelatin, gums, varnishes, and cases where there is a volatile solvent present, loss of which would alter the concentration of the filtrate, it has not been possible to isolate under all conditions each individual unit of the filter. The result of this has been that in the event of a defective cloth, or in pulp presses, a defective cake, it has hitherto been necessary to stop filtration, open the press, search for the defective cloth, or in pulp presses, wash all the pulp and start again.

To eliminate all this loss of time and material, the ideal press must be provided with means for seeing or inspecting the filtrate issuing from each filter unit; also a quick method of isolating each unit is necessary. In this way absolute control over the filtration process would be obtained, and in the case of a defective unit, it would only be necessary to cut out this particular unit, and continue the operation of the press without opening the same until such time as the rate of filtration slowed down to a point where it is advisable to open and clean.

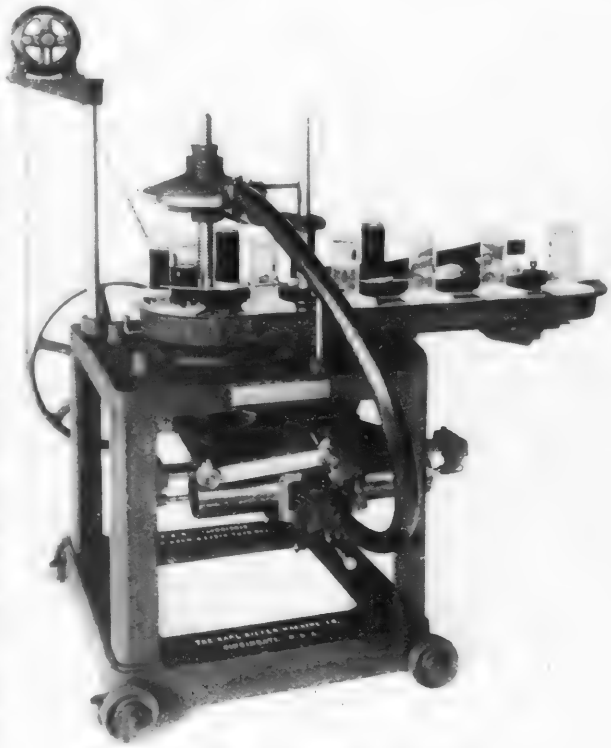
Any burst or defective cloth would be apparent at once owing to the closing of any unit showing defective filtration. In this way examination of each cloth would be dispensed with. The special filter which has been designed and patented for this class of work, and a very wide range of other products, embodies all the essential requirements specified above. It can be used also for filtering chilled or hot liquors. In addition, filtrates may be kept under pressure, and delivered direct to the bottling plant; for example, all kinds of carbonated liquors can easily be dealt with.

Samples of the filtrate can also be drawn from each filter chamber or unit during the time the press is functioning.

Provision is also made in this press for the replacement of any outlet which might get broken during filtration, without having to stop the general filtering operation.

Jam Filling Machine.

Opposite is illustrated a machine which is doing excellent service in the automatic filling of containers with viscous materials such as jams and marmalades. This is the Karl Kiefer Visco Jam Filling Machine —piston type—used in conjunction with bottle rinser, drying conveyor, and discharge conveyor. With such a layout, some 20,000 jars of 1 or 2 lbs. capacity can be filled per day of eight hours, with the aid of three operators only.



The Visco Jam Filling Machine.

Chemical Engineering Plant.

The well-known chemical engineer, Hugh Griffiths, B.Sc., A.R.C.Sc., M.I.Chem.E., formerly of 15, New Bridge Street, London, has transferred his headquarters to G. A. Harvey and Co. (London) Limited, 58, Victoria Street, London, S.W.1. The entire business of Mr. Griffiths has been acquired by Messrs. Harvey, so that in future his plant will be manufactured at the Woolwich Road Works, where there are special facilities for work of this kind. Mr. Griffiths will act as chemical engineer and technical adviser to the company, and in this capacity his services will be of incalculable value, since his experience in connection with plant for vacuum drying, evaporating, and distilling, and for crystallising and many other processing operations is probably unequalled by anyone in the country.

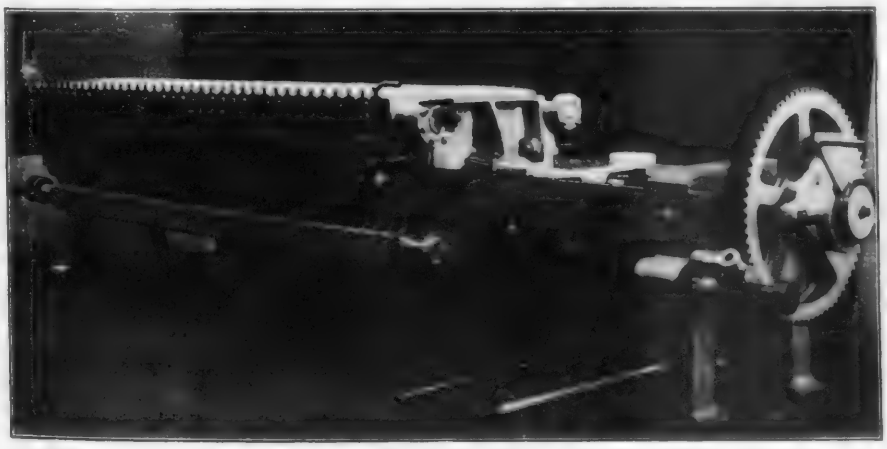
* * *

Messrs. Hansella, Limited, formerly of Hatton Garden, E.C.1, have moved their business to more spacious premises at Windsor House, Victoria Street, London, S.W.1.

* * *

A Vacuum Boiling Pan for Jams and Jellies.

We give on p. 146 a photograph of the Pfaudler Vacuum Pan and Preheater which is extensively used in the preparation of whole fruit preserves. At the lower right-hand corner is shown the preheater



The Kellie-Yates Filter Press.

and on the left the vacuum pan. In the Pfaudler processing methods, cold-packed strawberries, for instance, are thawed out, taken to the cooking room, the juice drawn off into the vacuum pan and the berries put in the preheater. Steam is turned on both preheater and pan, and the vacuum pump (shown in the middle of the picture) started. When the juice is sufficiently concentrated, it is returned to the berries in the preheater and brought to a temperature of about 160° F. Then the bath is drawn back into the pan for cooking and finally discharged to receiving vats in the bottling department. A steam pressure of about 20 lbs. is held on the jackets of pan and preheater and coils of the pan, and a vacuum of about 22 ins. of mercury on the pan when concentrating either juice or the batch. This vacuum corresponds to about 150° F. The working day is ten hours, of which one hour is taken for cleaning up. A maximum of 18 batches can be run through in the remaining 9 hours, or an average of 30 minutes per batch. At 850 lbs. per batch this is a daily production of 15,300 lbs. Production is about the same on all fruits handled.

* * *

Cutting and Scooping Machines.

Illustrations are given on p. 132 of the A.P.V. Orange and Lemon Cutting and Scooping Machines. These machines are extensively used in the jam trade for making marmalade and for peel cap. They are also in use for extracting the juice for cordials, essences, etc.

The first photograph shows the cutting machine. It will be noticed that the revolving disc has several **V**-shaped divisions, and there is a stainless steel, stationary knife which does the cutting. This machine will cut into halves from 30,000 to 40,000 fruits per day of eight hours. The disc and knife are both well guarded.

The photograph below shows the double-headed scooping machine on which are specially designed rose heads, for extracting the pulp from the halved fruits. This machine is very suitable where peel caps are being put down, and also when extracting juice for cordials, etc.

* * *

The Atalantic Sardine Packers of U.S.A. are formulating a joint advertising campaign, spending 550,000 dollars with the avowed object of making sardines an item in the nation's diet.

* * *

Counterblasts to chain store domination in the U.S.A. continue to be announced. The S.W. Simmons Corporation, which is made up of 90 manufacturing grocers, has established a new name "Plee-Zing" for the exclusive use of 25,000 independent grocers whom they supply.

* * *

Sixteen independent merchants in Waynesboro, Virginia, combined to run a full page in their local paper outlining the advantages of trading with them instead of with branches of the "chains." Price cutting tactics were denounced.

* * *

Coca-Cola, the popular American drink, shows increasing sales and increasing profits. Sales in 1929 were 13 per cent. higher than for 1928 and net income 25 per cent. up at 12,758.000 dollars.

* * *

On April 8 The British Thomson-Houston Co., Ltd., were honoured by a visit of H.R.H. the Duke of York to their Rugby works. The Duke visited not only a considerable part of the departments devoted to the production of electrical plant and machinery, but also inspected the Mazda Lamp works.

* * *

We have received from The Drayton Regulator and Instrument Co., Ltd., leaflets describing their Temperature Cycle Regulator Recorder, "M.S." Pressure and Vacuum Regulators, Indicating and Recording Liquid Level Gauges, and Air Compressor Sets.

* * *

We have received a copy of a paper read before the Society of Chemical Industry by J. S. Gard and R. S. Robinson on "The Insulation of Heated and Cooled Surfaces."

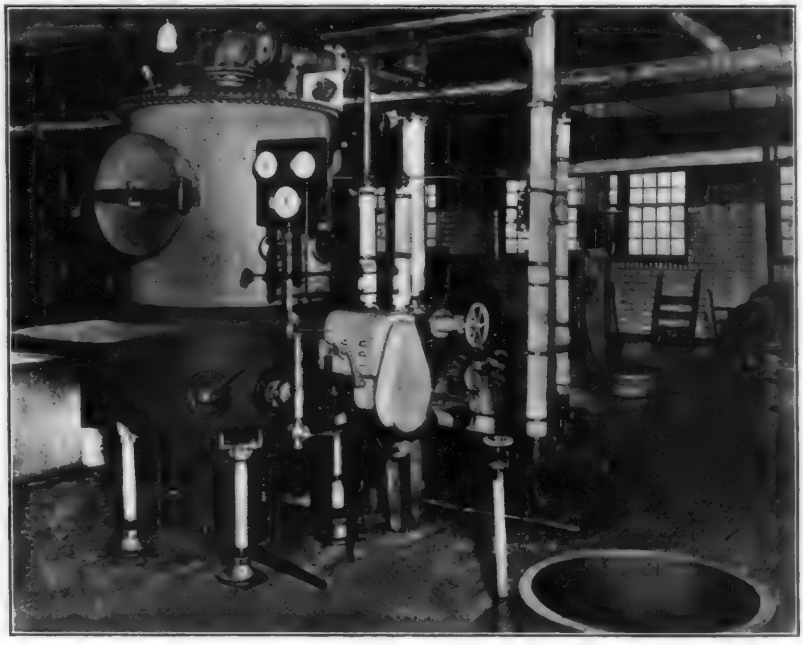
* * *

The Sixth Exposition of Chemical Plant will be held from June 10 to 22, 1930, at Frankfort, Germany. There will be meetings of the sponsoring association, the illuminating engineers, the rubber association, and other guilds and societies. There will also be lectures and a series of student course lectures. Motion pictures will also be shown, exhibitors will be able to show their films.

The last exposition drew together 266 exhibitors and 24,975 visitors, of which about 10,000 were chemical engineers and associated in the chemical industry, the remaining number being from related industries. The exhibit sections include scientific apparatus and instruments, laboratory equipment, acid, proof chemical stoneware, glass, and other ceramic products, machinery, apparatus, and auxiliary material for the oil and fat and lubricants industry, special educational exhibits and literature, large scale apparatus, machinery, and auxiliary equipment, raw materials for the chemical industry.

* * *

The date of the great British Empire Exhibition at Buenos Aires has now been definitely fixed, and it will be open from March 14 to April 27, 1931. This is a great improvement on the dates originally proposed (February 18 to April 2). By the middle of March the weather in Buenos Aires is becoming pleasantly cool, the population has returned from its summer holidays and business in all directions is becoming more active.



Pfaudler Vacuum Processing Pan for Jams and Jellies.

Book Reviews

Campbell's Book: A textbook on Canning, Preserving, and Pickling, by Clyde H. Campbell. Published by Canning Age, 521, Fifth Avenue, New York City. 1929. 4to. cloth, pp. 246, price $7.50.

This book, which claims to be the first complete treatise on the subjects mentioned in the sub-title, is dedicated to Food Packers in general, in the hope that they may find help in the production of purer and better commodities. The matters dealt with are canning in its varied aspects, jellies and preserves, vinegars, salted vegetables, condiments and sauces, and miscellaneous products, while tomatoes have a section to themselves.

In the canning section, although many of the fruits and vegetables are American specialities, a large part of the information cannot fail to be of value to English factories. It is interesting to note that included in the chapter on canning vegetables is a note on the packing of oysters, which are put up for the American market in 3, 4, 5, 8, and 10-oz. tins. There is a wealth of matter in these various notes; for instance, under the heading Peas will be found notes on the four-year rotation of crops for pea-growers; under Cherries a note on boiling the pits and using this juice in the cans; under Blackberries are quoted a Canners' Association's standard gradings. When Kraut is packed with either wieners or frankfurters these delicacies should be cooked first. There are brief notes on peeling certain fruits with a caustic soda solution. Among other bright spots in the book, it is strongly advised that all spaghetti shipments should be tested for nitrates, as this commodity absorbs ammonia fumes or nitrates, either because it is usually dried in rooms near the stables, thus absorbing the first, or the flour may be bleached by nitrous oxide fumes; thus a consignment may be condemned as being bleached when in reality it has only absorbed ammonia from the local stables.

There has been some attempt at standardisation in order to give all packers a fair deal by defining the terms used, especially as regards the types of sweetening matters used, also differentiating between "preserve" and "jam"; the former consisting of whole fruit or relatively large lumps. Regulations are adopted for the use of pectin, the fruit masses of apples, grapes, and citrus after the expression of the juices for other purposes. In the Pickles section there are many recipes, and in passing it is interesting to learn that there is a National Kraut Association, and among the many illustrations is a double-page chart of photographs of gherkins of all sizes. In the Vinegar section we find that this word covers only the liquor produced by acetous fermentation of apple juice, unless qualified by some other word such as apple-chop, malt, grape or wine, sugar, etc.

This monumental work cannot fail to be of the greatest use to the food manufacturer; there is a good index, thirteen double-column pages of bibliography, a large number of illustrations of plant and machinery, and a perfect encyclopædia of information. If a criticism may be offered it is that the title be changed to one more in keeping with the subject and less suggestive of "Peck's Bad Boy."

Meats and Meat Products, by William Henry Tomhave, M.S. Published by the J. B. Lippincott Co., London. 1930. Cloth, 8vo. pp. ix-418, illust., price 12s. 6d.

This book, which is one of Lippincott's Farm Manuals, issued under the general editorship of Dr. Kary C. Davis, is one having a wide field of interest; it covers many diverse subjects allied to the butchery business, including Cattle Diseases, Slaughtering, By-products, Canning, Hides, Inspection, and many others.

The present volume is intended for the use of teachers and students of agriculture and home economics, very little being hitherto available in text-book form; the matter is based on long experience in teaching meat courses, emphasis being laid upon the composition and food value of meats, while the needs of farmers and housewives have been met in the detailed information concerning the home meat supply. There is also matter for the retailer on the handling and cut values. Direct references and a bibliography give sources of much of the information; special note should be taken, too, of the photographs illustrating the slaughtering and cutting up of all kinds of beasts.

In the discussion of the value of foods of animal origin it is interesting to see the variations in *per capita* consumption of different countries which, though not strictly comparable as regards dates, afford a rough guide. It is seen that while Argentines and Australians consume 281 lbs. and 262 lbs. respectively, Americans and English eat only 142·4 lbs. and 120 lbs.; Italy appears at the bottom of the list with 46·5 lbs. It is of interest to note, in passing, that the American name for goat meat is "chevron." A valuable chapter is that on the composition and food values of various meats, containing many diagrams and tables. It is a matter of regret that under the heading of Vitamins the author does not discuss the effect, if any, of cooking upon their properties. The need for expert supervision in connection with the many causes of meat being unfit for food is insisted upon.

The sections devoted to slaughtering and dressing contain many photographs of these processes, the majority of which are very clear and informative, as are, also, the pictures of joints. A valuable chapter for retail butchers is the one on carcase yields and ratios of cuts, with its tables and diagrams. In connection with fats will be found notes on the oleomargarine and soap trades. Owing to a mistake in binding the review copy, the chapter on judging carcases is omitted. There are useful chapters on shipping and refrigeration, with the effect of the latter upon the meat. The extreme care taken in inspecting and passing for human consumption all meat brought to the market is mentioned. and there are several appendices showing in tabular form statistics of the American meat trade.

This book is eminently readable and cannot fail to be of interest to all connected with the marketing of meat for food, nor of value to all young members of the butchery trade.

Correspondence

To the Editor.

DEAR SIR,

We have read the series of articles appearing in the current issue of FOOD MANUFACTURE on Colourings and Flavourings, much of which we find of interest.

We must, however, disagree with the statement of Mr. Humphriss when he says, in reference to colouring matter for ice-cream: "The most generally used and universally satisfactory agent for this purpose is annatto." Annatto has been superseded to a very large extent for use in foodstuffs by the synthetically produced, guaranteed harmless yellow colours now on the market. The unsatisfactory methods at one time used (and, maybe, are still used) for packing annatto for importation to this country were not conducive to "universal satisfaction."

The actual annatto, we maintain, has no advantage over the synthetic colour and the latter is much more economical and, if bought from a reliable source, bears a guarantee of harmlessness.

Yours faithfully,

WILLIAMS (HOUNSLOW), LTD.

* * *

To the Editor.

DEAR SIR,

Messrs. Williams', Ltd., letter contesting my statement about the popularity of annatto as a colouring agent certainly commands respect, for their long association with the colour industry places them in a unique position to diagnose the trend of events in this respect.

Nevertheless, though the statement in dispute may possibly have been a shade too dogmatic and sweeping, so far as the ice-cream industry is concerned, I think it will be found to be substantially true.

I am, at any rate, aware of several large manufacturers of ice-cream, producing a quality product, who use annatto to restore the cream colour to their mix, and personally haven't found any outstanding causes for dissatisfaction with such preparations of annatto as I have had occasion to use.

Perhaps it may be of interest just to jot down the factors which seem to one to have exercised most influence in the ice-cream industry in this matter of colour.

1. Quite a large proportion of genuine ice-cream made in this country is so made by dairying firms; the prevalence of the use of annatto in dairying surely needs no emphasis. The obvious thing for such people to use for ice-cream was therefore—annatto, and it cannot be gainsaid it answers the purpose very well.

2. The other chief influence operating, at any rate up till now, is the fact that America is undoubtedly the pioneer in ice-cream manufacture on a commercial scale, and hence we are at present largely following their practice; thus what they do, or have done, inevitably exercises its effect on our own practice.

In 1907 the Federal Pure Food Laws prohibited the use of aniline colours in foods, the result being that vegetable colours became very largely used, especially in dairying. True, in 1920 the U.S. Dept. of Agriculture certified for use in foods certain dyes, amongst them the yellow dyes—

Tartrazine,
Ortho-toluencazo-β-naphthylamine,
Benzeneazo-β-naphthylamine,

yet in a volume on *Ice-Cream*, published in 1928 in America, and written by Professors Turnbow and Raffetto, we find the above-mentioned dyes "are used to some extent in colouring butter and oleomargarine, although they have been largely displaced for this purpose by a colour made from annatto seed."

Therefore, though I hold no brief for annatto, I think the case in justification of the statement made (if not too sweepingly interpreted) is, at any rate, valid.

Yours faithfully,

E. HUMPHRISS.

* * *

To the Editor.

DEAR SIR,

I really cannot resist Messrs. Storer's invitation to state my preference as between egg and milk and a like quantity of cream and milk.

Well! personally—give me anything but egg and milk—I detest the concoction!

This is, anyhow, probably my loss, but I cannot agree that palatibility is the acid test of mix ingredients, though that factor is, in any food, a very important one. Such considerations as protein, fat, carbohydrate balance with respect to the ideal food ratio, for instance, should also be taken into account in the construction of a mix formula.

The ascribing of such a position to palatibility alone is also rather opposed to the views expressed editorially in regard to ice-cream on page 66 of the March FOOD MANUFACTURE.

In connection with pasteurisation, for the benefit of non-technical readers who possibly might erroneously infer from Messrs. Storer's letter that all bacteria are destroyed at pasteurisation temperatures, it may be stated that the more commonly occurring pathogenic forms only are destroyed by thirty minutes' heating at 145° F. Such organisms, as, for instance, *Bacillus Anthracis*, though the cause of that rapidly fatal disease of man and cattle—anthrax—are not only not destroyed by pasteurisation, but are capable of resisting much higher temperatures for considerable periods of time when in the "spore" form. Such a reading of the sentence was, I realise, not intended by Messrs. Storer, and the point is only elaborated to avoid possible misconception.

Re homogenisation one would just say that the clustering of the fat globules after a single stage homogenising, and the prevention of this phenomenon by suitable double stage homogenisation, are both

scientific facts, and have been demonstrated microphotographically, and as such simply have to be accepted.

What the explanation of the clustering is, is at the moment a matter (so far as I am aware) of speculation only, and might be explicable on several physio-chemical or even electrical grounds.

May I, in conclusion, thank Messrs. Storer for their courtesy and appreciation.

Yours faithfully,
E. HUMPHRISS.

* * *

To the Editor.

DEAR SIR,

Messrs. William Storer, Ltd., state in their letter appearing on page 115 of FOOD MANUFACTURE that "The yolk of an egg consists of 46·25 per cent. solids and 53·75 per cent. water. The solids in this yolk contained 17·5 per cent. oil or fat, and 28·75 per cent. mineral salts." Surely something has gone wrong with this analysis! Bulletin 471 of the U.S. Department of Agriculture gives the average composition of hen yolk as: Moisture, 49·5 per cent.; protein, 15·7; fat, 33·3; ash, 1·1.

I am,
Yours truly,
GEO. H. SEARLE.

The analysis of egg-yolk quoted above by our correspondent agrees with the one given by Dr. W. Tibbles. Probably they are from the same source. H. E. Cox in his *Chemical Analysis of Foods* quotes an analysis by Plimmer, giving: Moisture 53·1 per cent., protein 14·4, fat 29·3, ash 2·0, undetermined 1·20. A. E. Leach gives water 73·7 per cent., protein 14·8, fat 10·5, ash 1·0, for the edible portion of hen's egg.

Another authority quoting, apparently, mainly Bulletin 28, U.S. Department of Agriculture, gives:

	"Wet" State. Per Cent.	*Dry Substance.* Per Cent.
Fat (N x 6·25)	10·50	39·90
Protein	13·40	56·30
Ash	1·00	3·80
Water	73·70	—

this is also presumably "whole egg."

Halliburton gives WHITE of egg as consisting of solids 13·30 per cent., of which 12·2 is protein in nature, "sugar" equals 0·50 per cent., inorganic salts 0·60 per cent., with traces of fats, lecithin, and cholesterol. He unfortunately gives no data respecting yolk.

Enquiries

100. Required, recipes for meat pastes which could be made by utilising bacon factory trimmings, etc.

101. Names of makers of can seaming machines required.

102. What is the Ice-Cream Association standard recipe for vanilla ice-cream?

103. Wanted, advice on equipment of small jam factory.

Reply to Enquiry No. 102.

No Ice-Cream Association standard recipe exists. In 1927 the Ice-Cream Association sent a deputation to the Ministry of Health with certain recommendations re legislation respecting ice-cream, among which it was suggested that ice-cream should contain not less than 8 per cent. milk fat and 10 per cent. M.S.N.F. Appended is a "mix formula" utilising 50 per cent. cream and skim milk powder which conforms to above suggested minima which is calculated:

	Lbs.	
Milk (3·4 per cent. Fat and 8·70 per cent. M.S.N.F.)	71·6	(say 7 galls. approx.)
Cream (50 per cent. Fat and 4·5 per cent. M.S.N.F.)	11·13	(say 1 gall. 26 fl. ozs. approx.)
Skim Milk Powder ...	3·27	(say 3¼ lbs. approx.)
Sugar	13·50	
Gelatin	00·50	
Mix Weighs	100·00	

Using above testing ingredients this mix gives an analysis of:

	Per cent.
Fat	8·00
M.S.N.F.	10·00
Sucrose	13·50
Gelatin	00·50
Total Solids	32·00

A mix of any gross weight can, of course, by simple proportion, be computed from this. Naturally, a large variety of dairy products could, with equal facility, be utilised to compound a mix of this composition, and if the enquirer will state his case in detail, what he desires, ingredients he proposes using (with, if possible, their analysis), apparatus available, etc., we will endeavour, if he likes, to provide him with some useful matter bearing thereon.

London Gazette Information

Merchandise Marks Act, 1926

H.M. in Council on March 28 approved an Order in Council under the above-named Act, entitled the "Merchandise Marks (Imported Goods) No. 1 Order, 1930." Copies of the Order, when published, may be purchased from H.M. Stationery Office.

FOOD MANUFACTURE is sent to any address in the World for 10s. per annum. Send your subscription now to LEONARD HILL, LTD., Thanet House, 231-2, Strand, London, W.C. 2.

New Companies

CORNISH FOOD PRODUCTS, LIMITED. (246723.) 51, Manchester Road, Denton, Manchester. To carry on the bus. of mnfrs. of fish products; fish and oil mchts., etc. Nom. Cap.: £5,000 in £1 shares.

WM. E. MARSHALL, LIMITED. (246879.) To carry on the bus. of corn and cake mchts., hay and straw mchts., etc. Nom. Cap.: £2,000 in £1 shares.

MOLSON, LIMITED. (246870.) To carry on the bus. of wholesale and retail pig dlrs., butchers, etc. Nom. Cap.: £100 in £1 shares.

COPEMAN AND LACY, LIMITED. (246758.) To take over the bus. of a grocer and provision mcht. cd. on at Aldershot as "Copeman and Lacy." Nom. Cap.: £2,000 in £1 shares.

FELIX FOOD, LIMITED. (246825.) 24 and 26, Holborn, E.C. 1. To carry on the bus. of mnfrs. and sellers of food for animals, etc. Nom. Cap.: £3,000 in 5s. shares.

LEA AND PERRINS, LIMITED. (246784.) To take over the businesses of mnfrs. of and dlrs. in sauces and other products belonging to Lea and Perrins cd. on in Great Britain and elsewhere. Nom. Cap.: £250,000 in £1 shares.

ALEX, LIMITED. (246673.) 62, Parade, Birmingham. To carry on the bus. of bakers, confectioners, etc. Nom. Cap.: £500 in £1 shares.

MARGARINE DISTRIBUTORS, LIMITED. (247070.) To carry on bus. as indicated by the title. Nom. Cap.: £500 in £1 shares.

JOHN FRANCIS JENNINGS, LIMITED. (246694.) To carry on the bus. of confectioners, tobacconists, caterers, etc. Nom. Cap.: £1,000 in £1 shares.

SCOTCH BAKERY (EASTBOURNE), LIMITED. (247099.) To take over the bus. cd. on at Eastbourne as "The Scotch Bakery." Nom. Cap.: £11,000 in £1 shares.

FERRIS'S (HOYLAKE), LIMITED. (246980.) 3, Rumford Place, Liverpool. To take over the bus. of a baker, confectioner, and café propr. cd. on at Market Street, Hoylake and Grange Road, West Kirby, by W. F. Ferris, and that of a fishmonger and poulterer cd. on by him at Market St., Hoylake, as R. Clarke and Co. Nom. Cap.: £2,500 in £1 shares.

T. S. GREEN AND SON, LIMITED. (247101.) To take over the bus. of a wholesale and retail grocer, baker, and provision dlr. cd. on at 33, Nile Street, and Sylvester Street, Burslem, and at Hanley and elsewhere, as "T. S. Green and Son," and also the similar bus. cd. on at 47, Queen Street, Burslem, and elsewhere, by the executrix of the late W. R. Berrington. Nom. Cap.: £15,000 in £1 shares (3,000 pref. and 12,000 ord.).

W. PURDY, LIMITED. (247076.) Ormond Road, Great Yarmouth. To carry on the bus. of bakers, confectioners, etc. Nom. Cap.: £1,000 in £1 shares.

LEWIS TILBURY AND COMPANY, LIMITED. (247044.) To take over the bus. of mchts. and contractors of and dlrs. in spices, cereals, foodstuffs, etc., cd. on at 41, Eastcheap, E.C. 3, by Lewis Tilbury and Co. Nom. Cap.: £25,000 in £1 shares (7,000 pref. and 18,000 ord.).

HERTFORDSHIRE FARMS, LIMITED. (246988.) 14, Glenferrie Road, St. Albans. To carry on the bus. of dairymen, etc. Nom. Cap.: £2,000 in £1 shares (1,000 pref. and 1,000 ord.).

HELMSTONE, LIMITED. (247008.) 115, Western Road, Brighton. To carry on the bus. of wholesale and retail provision and genl. mchts., etc. Nom. Cap.: £2,500 in £10 shares.

JOHN R. SORENSEN AND COMPANY, LIMITED. (246962.) To take over the bus. of a supplier of bakers' and confectioners' sundries, etc., cd. on at 2, Cathedral Street, Manchester, by Johannes R. Sorensen. Nom. Cap.: £3,000 in £1 shares.

ROE AND COMPANY, LIMITED. (247256.) 25 and 26, Market Place, Halesworth, Suffolk. To take over the bus. of grocers, provision mchts., etc., cd. on at Halesworth as "Roe and Co." Nom. Cap.: £20,000 in £1 shares.

PRINGLE'S STORES, LIMITED. (247290.) To take over the bus. of grocers, provision mchts. and drapers cd. on at Easington Lane, Durham, as "J. G. Pringle." Nom. Cap.: £1,000 in £1 shares.

J. SLATER AND SONS, LIMITED. (247242.) Cleveleys Road, Accrington. To take over the bus. of a wholesale, retail, and mnfg. confectioner cd. on at Accrington as "J. Slater and Sons." Nom. Cap.: £1,000 in £1 shares.

FLEMING'S, LIMITED. (247199.) 14, Wendall Road, Shepherd's Bush, W. 12. To carry on the bus. of mnfrs. of and dlrs. in ice-cream, etc. Nom. Cap.: £200 in £1 shares.

SCARBOROUGH DIRECT SUPPLY TABLE WATERS, LIMITED. (247223.) 22a, Barwick Street, Scarborough. To carry on bus. as indicated by the title. Nom. Cap.: £800 in £1 shares.

ORANGE CRUSH BOTTLING COMPANY (1930), LIMITED. (247213.) Purity Aerated Water Works, Fernbrook Avenue, Southend-on-Sea. To enter into an agreement with the Orange Crush Bottling Co., Ltd., by its liquidator, and to carry on bus. as indicated by the title. Nom. Cap.: £5,000 in £1 shares.

HAYDOCK FARM DAIRY COMPANY, LIMITED. (247010.) Haydock Lodge Farms, Haydock, Lancs. To take over the bus. cd. on at Newton le Willows, Lancs., as Haydock Lodge Farms. Nom. Cap.: £1,000 in £1 shares.

DEVA CONFECTIONERY COMPANY, LIMITED. (247062.) 44a, Frodsham Street, Chester. To carry on bus. as indicated by the title. Nom. Cap.: £2,000 in £1 shares.

A. EVANS AND COMPANY, LIMITED. (247168.) To take over the bus. of grocers and provision mchts. cd. on at 4 and 5, Ceridwen Street, Mardy, Rhondda, by A. Evans and Co. Nom. Cap.: £1,000 in £1 shares.

Current Literature

Fruit and Vegetable Products

163. Canned Irrigated Peaches. P. F. Nichols. (*Fruit Prods. J.*, p. 211, March, 1930.)
164. Pasteurised Dried Fruits. C. R. Fellers. (*Ibid.*, p. 214.)
165. Dried Fruits in World Trade. R. S. Hollingshead. (*Ibid.*, p. 217.)
166. Important Considerations in Pickle Manufacture. F. W. Fabian. (*Ibid.*, p. 219.)
167. Relation between Constituents of Peach Juice and the Keeping Quality of the Fruit at Low Temperature. G. Leoncini and G. Levi. (*Boll. inst. agri. Pisa*, 4, p. 505.)
168. Utilisation of Surplus Prunes. E. M. Mrak and W. V. Cruess. (*Univ. Calif. Agr. Exp. Bull.* 483, 1929.)
169. Causes and Prevention of Crystallisation in Raspberry Syrups. V. Stanek and P. Pavlas. (*Zeit. Zuckerind. Czechoslov.*, p. 25, 1929.)
170. Manufacture and Preservation of Cranberry Products. C. R. Fellers and F. P. Griffiths. (*Mass. Agr. Exp. Sta. Bull.* 247, 1929.)
171. Spoilage in Frozen Fruits. C. A. Magoon. (*Glass Packer*, p. 137, March, 1930.)
172. Gas Storage of Fruit—II. F. Kidd and C. West. (*J. Pomology*, p. 67, 8, 1930.)
173. Storage of Pears in Artificial Atmospheres. S. A. Trout. (*J. Pomology*, p. 78, 8, 1930.)
174. The Antiscorbutic Fraction of Lemon Juice—VIII. S. Zilva. (*Biochem. J.*, p. 1199, 1929.)

Cereal Products

175. Cool Doughs and Low Temperatures. V. F. Richter. (*Arkady Rev.*, p. 28, April, 1930.)
176. Blending Flours. W. P. Ford. (*Ibid.*, p. 42.)
177. Colloid Chemistry of Bread-Making. Staleness in Bread. A. Whymper. (*Ibid.*, p. 45.)
178. Some Properties of Wheat Flours. E. Cazaubon. (*Bull. Assoc. Chim. Sucr.*, p. 44, 47, 1930.)
179. Laboratory Determination of Baking Value of Wheat Flour. C. Schweizer. (*Mitt. Lebensm. Hyg. Schweiz. Gesundh.*, p. 78, 18, 1927.)
180. Change in Acidity of Bread During Storage. L. Karácsonyi. (*Magyar Chem. Fol.*, p. 22, 35, 1929.)
181. Preliminary Studies in the Bacteriology of Wheat and Flour. D. W. Kent-Jones and A. J. Amos. (*Analyst*, p. 248, April, 1930.)

Dairy Products

182. Disposal of Creamery Wastes. C. E. Slaughter. (*Mich. State Coll. Eng. Exp. Sta. Bull.* No. 18, 1928.)
183. Influence of Rennin on the Ripening of Cheese. J. Hawesson. (*Lait*, pp. 2, 148, 358, and 500, 9, 1929.)
184. Seasonal Variation in the Vitamin Content of New Zealand Butter. J. Malcolm and E. A. Pope. (*N.Z. J. Sci. Tech.*, p. 228, 11, 1929.)
185. Butter Fat Losses in Buttermilk. W. H. Udy. (*Ibid.*, p. 249.)
186. Influence on Butter of Salts Associated with Common Salt. F. Budagjan and W. Pawlow. (*Z. Unters. Lebensm.*, p. 600, 1929.)

Analysis

187. Estimation of Water Content in Dried Fruits. J. Pritzker and R. Jungkunz. (*Z. Unters. Lebensm.*, 57, p. 520, 1929.)
188. Detection of Adulteration in Milk. Szelinski. (*Chem. Ztg.*, p. 173, 54, 1930.)
189. Comparative Analyses of Cured Pork Products. C. R. Barnicoat. (*N.Z. J. Sci. Tech.*, p. 245, 11, 1929.)
190. Detection of the Bleaching of Flour with Chlorine and Nitric Oxide. J. Kulman. (*Z. Unters. Lebensm.*, p. 635, 1929.)

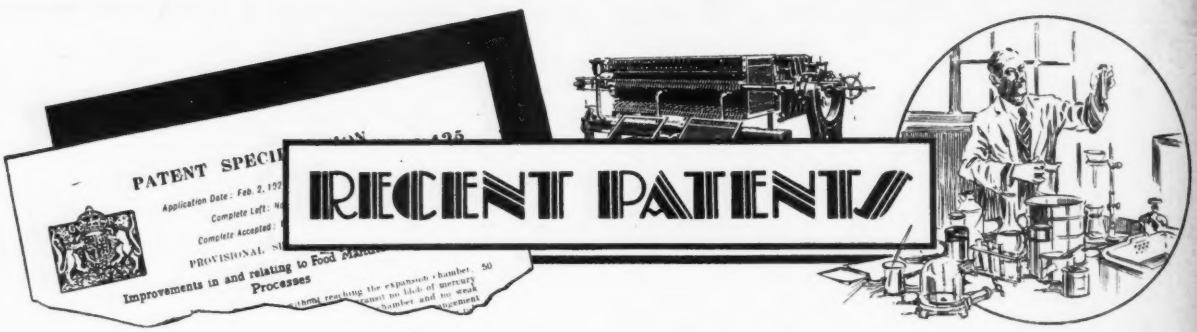
Various

191. Planning a Cannery. O. H. Barnhill. (*Canning Age*, p. 261, March, 1930.)
192. Practical Methods of Mayonnaise Manufacture. (*Glass Container*, p. 16, March, 1930.)
193. Methods of Extraction Employed in the Manufacture of Vanilla Extract. E. J. Kessler. (*Glass Packer*, p. 24, January, 1930.)
194. Structure of Fats and its Bearing on their Utilisation. T. P. Hilditch. (*Chem. Age*, p. 238, March 15, 1930.)
195. Vanilla Flavouring Extract and Problems Connected with its Manufacture. E. J. Kessler. (*Glass Packer*, p. 140, March, 1930.)
196. Factors Influencing Keeping Quality of Hens' Eggs. P. F. Sharp. (*Ice and Refrigeration*, p. 253, March, 1930.)
197. Enzyme Activity of Ice-Cream Improvers. P. A. Tracy and H. A. Ruehe. (*Univ. Ill. Agric. Exp. Sta. Bull.* No. 333, 1929.)
198. Are Lipoids Fats? B. Rewald. (*Chem. Ztg.*, p. 134, 54, 1930.)

Extract of Paper Read at the Meeting of the Society of Public Analysts on April 2.

Routine Detection of Nitrates in Milk. By A. F. Lerrigo, B.Sc., F.I.C.

The statement of Kohn-Abrest and Kawa-kibi that cows' milk may contain more nitrate than drinking waters has not been confirmed, although all specimens of human milk examined gave a positive reaction for nitrates. A modification of the diphenylamine test is recommended as a rapid routine test for nitrates in milk, and has been found capable of detecting the addition of 5 per cent. of a water containing about 0·5 part of nitric nitrogen per 100,000. The test is regularly applied in Birmingham to all samples of milk containing less than 8·5 per cent. of solids-not-fat.



These particulars of New Patents of interest to readers have been selected from the Official Journal of Patents, and are published by permission of the Controller of H.M. Stationery Office.

Latest Patent Applications

10440. BUSCHE, H.: Method of preserving mayonnaise. April 2.

10630. DUNNEBIER, M., AND WINKLER, A.: Manufacture of chocolates, etc. April 3.

10631. DUNNEBIER, M., AND WINKLER, A.: Manufacture of covering sweets, biscuits, etc., with chocolate, etc. April 3.

9619. CHAMBERS, R. M., AND DEMPSEY, J.: Depositing machines for dough, etc. March 26.

8864. BAKER, G. R., AND BAKER PERKINS, LTD., AND WILSON, G. D.: Coating confectionery, etc. March 19.

8478-8479. BARKER AND DOBSON, LTD., AND ROBERTS, P. L.: Manufacture of sweetmeats. March 17.

Specifications Published

326,772. POTT, F. M.: Food-stuffing.

326,847. MODERN FOOD PROCESS CO.: Sausage products, and method of making and marketing same.

326,742. TRIGGS, W. W. (VAN DEN BERGH'S MARGARINE GES.): Preparing margarine from vegetable fats.

326,156. GRINDROD, DR. G.: Food products, and processes and apparatus for manufacturing the same.

326,264. ROGERS, F. H. (INTERNATIONAL WHEAT MALT SYRUP CO.): Wheat syrup and process of making the same.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2., at the uniform price of 1s. each.

Abstracts Published

325,181. **Kneading machines.** PONISCH, M., 10, Lindenaustrasse, Leutzsch, Leipsic, Germany.

A kneading machine comprises a horizontal rotary table, a vertically adjustable kneading roll, and a blade mounted so as to be adjustable about a vertical axis and shaped like a plough for turning the material over. The table, cooled by water sprayed on its under surface, is rotated by bevel and reducing gear from a main shaft, which also drives the kneading roll through chain gearing. The roll is mounted on pivoted arms and can be adjusted vertically by a screwed rod operated by a bevel gear from a hand-wheel. The blade is pivoted to a vertical rod and is furnished with a handle by means of which it can be given angular adjustment.

Recent Trade Marks

This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal," and is published by permission of the Controller of H.M. Stationery Office.

VITACREMOO

508,913. **Substitutes for cream, and foods for infants and invalids.** VITACREAM, LIMITED, 2, Stockholm Road, South Bermondsey, London, S.E. 16. April 9. (Associated.)

WHITE KNIGHT

510,122. **Cocoa, chocolate, and confectionery, but not including ice-cream and not including any goods of a like kind to ice-cream.** GEORGE PAYNE AND COMPANY, LIMITED, 21 to 24, Queen Elizabeth Street, Tower Bridge, London, S.E. 1. April 9.

BINKIE

510,978. **Condensed milk and cream.** S. D. SIMOND AND COMPANY, LIMITED, 28, Monument Street, London, E.C. 3. April 2.

NUTRIMALT

510,046. **Malted bread.** BILSLAND BROTHERS, LIMITED, 75, Hydepark Street, Glasgow, C.3. April 2.

CROQUET

510,567. **Cocoa, confectionery, biscuits, and chocolate.** CADBURY BROTHERS, LIMITED, Bournville, Birmingham. March 26.

JOYBELLS

510,626. **Biscuits.** PEEK, FREAN AND COMPANY, LIMITED, 158, Drummond Road, London, S.E. 16. March 26.

KALOR

505,781. **Beverages, syrups, and cordials in class 42.** KIA-ORA, LIMITED, 35 to 38, Rushworth Street, Blackfriars, London, S.E. 1. March 19. (Associated.) (By Consent.)